AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

CIVILIAN AND DEFENSE

In This Issue . . .

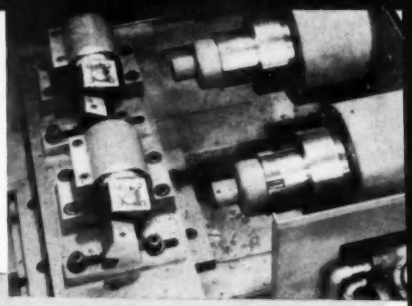
Advances in Automation · · · Paris Show · · · Aluminum Mollerizing · · · Packaging Awards · · · Latin American Machine Tool Market · · · Gas Turbine Sports Car · · · Z-F Differential

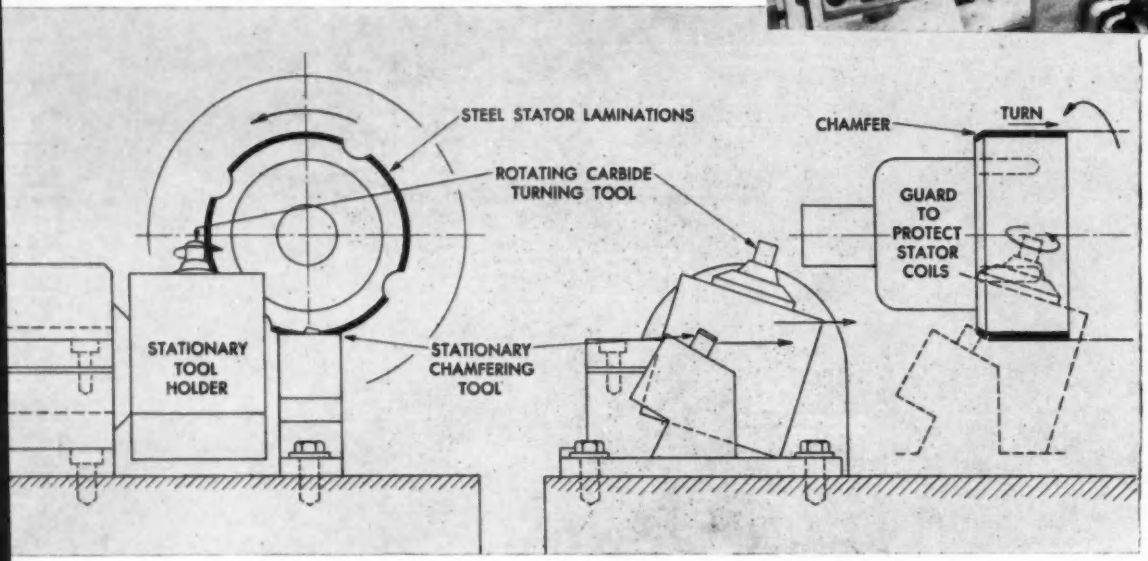
NOVEMBER 15, 1952

Complete Table of Contents, Page 3

A CHILTON PUBLICATION

ROTATING TOOL
does a good turn





End and side view sketch of rotating tool setup for turning motor stator assemblies on Heald Model 221 Bore-Matic.

Free-turning tool arrangement on Heald Model 221 Bore-Matic gives longer tool life on steel stator job

• Although this unusual setup is rather limited in application, it's an interesting example of how Heald engineering solved a specific precision finishing problem.

The parts, laminated steel motor stator assemblies with interrupted surfaces, are turned and chamfered, two at a time, in a single high-speed automatic cycle. The carbide turning tools are free to rotate in their tool holders, and are driven on their own longitudinal axis by contact with the rotating surface of the work. Hence a new, cool cutting edge is continually being presented to the work, materially increasing the effective life of the tool.

As the motor stators are precision finished with the coils and leads in place, a guard or shield is attached to the open end to keep out metal shavings.

Remember — when it comes to precision finishing it pays to come to Heald.

HEALD

Heald precision speeds the nation's production

INTERNAL AND ROTARY SURFACE GRINDING MACHINES AND BORE-MATICS

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



On the Mesabi Range this 20-tonner hauling iron ore is a Walter Dumper powered by a Waukesha Super-Duty Six 6-WAK Butane Engine

WAUKESHA Super Duty Six

1197 CU. IN. 6-WAK SERIES ENGINES

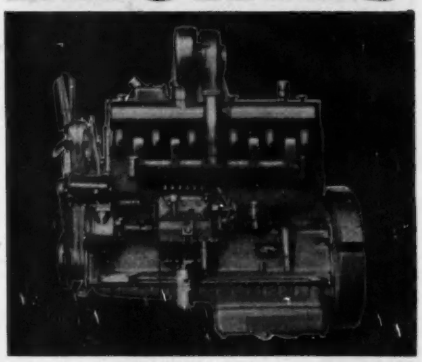
Includes

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- **6-WAK—Gasoline Engine**
- **6-WAKD—Diesel Engine**
- **6-WAKDS—Supercharged Diesel Engine**

UP TO 352 MAXIMUM HORSEPOWER

Standard or Counterbalanced Crankshafts Available.
Consult Waukesha on permissible speeds for your service.

Send for Bulletins.



New Supercharged 6-WAKDS Diesel, with center-mounted turbocharger; 6-cyl., 6¼ x 6½, 1197 cu. in., 352 max. hp.

WAUKESHA MOTOR COMPANY • WAUKESHA, WISCONSIN

NEW YORK TULSA LOS ANGELES 193


MATTISON
Here is a Mattison three head Vertical Spindle Rotary Automatic Grinder at the Ford Cincinatti Automatic Transmission Plant, finishing converter housings to close limits of accuracy on a real production basis. Work pieces are held in automatic clamping fixtures. Automatic sizers are constantly in operation, checking the work and keeping all pieces within specified tolerances without operators attention.
This is only one of the many grinders made by Mattisons. Whatever your surface grinding problem may be, write us for our recomendation on the proper method and machine for your job.
MATTISON
MACHINE WORKS
ROCKFORD · ILLINOIS

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

November 15, 1952 Vol. 107, No. 10

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AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

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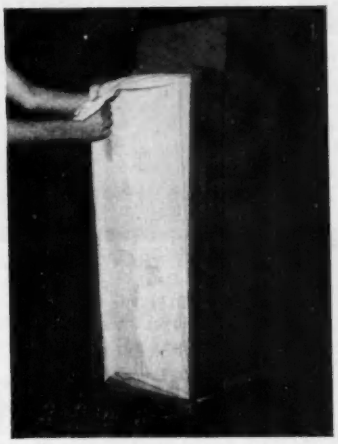
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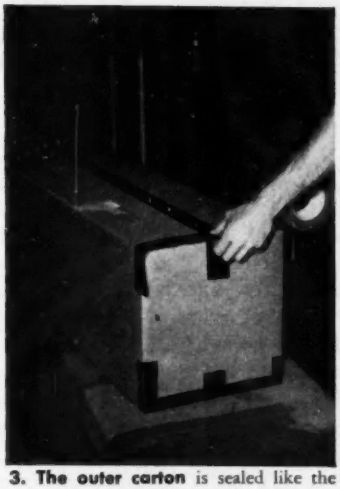
How Stewart-Warner makes ONE TAPE do the WORK OF TWO



1. A packaged South Wind heater for the Army is sealed with waterproof Polyken Tape No. 215.



2. The carton is then bagged in an aluminum foil-lined sack from which the air is removed. This bag is placed in a slightly larger carton.



3. The outer carton is sealed like the inner one with Polyken Tape No. 215.



4. Spare parts get the same government-approved treatment.

Polyken Industrial Tape Cuts Costs and Improves Gov't Spec. Packaging of South Wind Heaters

Stewart-Warner Corp. formerly used *two* different tapes to seal inner and outer cartons containing South Wind automotive and aircraft heaters for military and civilian use.

Then they switched to waterproof Polyken Tape No. 215 for *both* jobs. A follow-up check by packaging engineers revealed that the cartons were being sealed more securely, packaging costs had been reduced and the possibility of workers using the wrong tape had been eliminated.

Polyken No. 215, ideally suited for this Stewart-Warner job, is economical, waterproof, and conforms to Government Specifications JAN-P-127, Type 1 Grade B.

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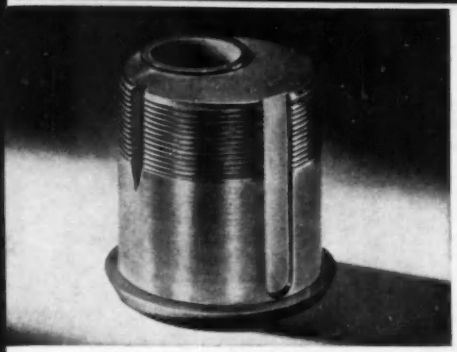
For specifications, samples, and further information on No. 215 and other Polyken Tapes, please send me your *FREE BOOKLET*, "Tape is a Tool."

Name_____ **Title**_____

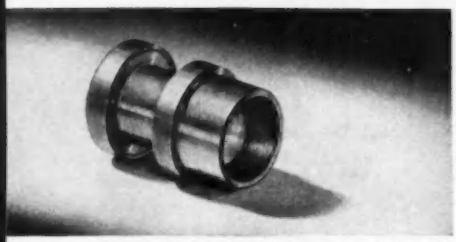
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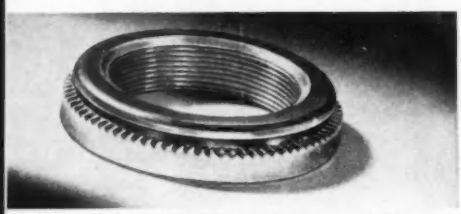
City_____ **Zone**____ **State**_____



LOCK CYLINDER. Metal: 1⅜" dia. brass • Machine: model 601 New Britain Gridley • Operations: *cross slide*—rough form, finish form, break down cut off, side mill, vertical end mill, final cut off; *tool slide*—face, drill offset hole, ream and counterbore offset hole, thread • Spindle Speed: 1,324 rpm • Feed: .006" per revolution • Tools: high-speed steel • Cycle Time: 7.3 seconds



CARPENTER'S PLANE PART. Metal: ⅞" B1113 steel • Machine: Brown & Sharpe Automatic Screw Machine • Operations: *front cross slide*—form; *rear cross slide*—cut off; *turret*—feed stock, spot drill, drill 13/32" hole, tap drill, reverse spindle and tap left-hand thread • Spindle Speed: 1,180 rpm • Feed: .0025" per revolution • Tools: high-speed steel • Cycle Time: 30 seconds



KNOB INSERT. Metal: 1⅜" round aluminum • Machine: model 61 1⅝" New Britain Gridley • Operations: *cross slide*—form, knurl, cut off; *tool slide*—spot drill, tap, ream, recess • Spindle Speed: 1,600 rpm • Feed: .005" per revolution • Tools: high-speed steel • Cycle Time: 7 seconds

SUN OIL COMPANY, Dept. AA-11,
Philadelphia 3, Pa.

I am having trouble possibly caused by an inadequate cutting oil. I would like ☐ the services of a Sun representative; ☐ the booklet "Cutting and Grinding Facts."

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Title_____

Company_____

Street_____

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MORE THAN 300 PARTS ARE MACHINED with the aid of *one* cutting oil for tools and hardware items made by Sargent & Co. Raw materials worked are: B1113 steel, 11ST-3 aluminum, ASTM-B140-46 Type B half-hard bronze, B16-46 brass, and Type 416 stainless steel. Stock ranges from 1/16" wire to 2" bars.

SINGLE GRADE OF SUNICUT REPLACES 4 CUTTING OILS

A good example of cutting-oil economy and efficiency is provided by Sargent & Co., well-known hardware and tool manufacturers. Their complete line requires the machining of more than 300 parts from a wide range of metals. A few years ago this company was using four different cutting oils, purchased in drums. By switching to a single product, Sunicut 11W, and buying it in bulk, Sargent has been able to effect an annual saving of about $3,000. All operations are performed as well as before, or better—and shop efficiency is up.

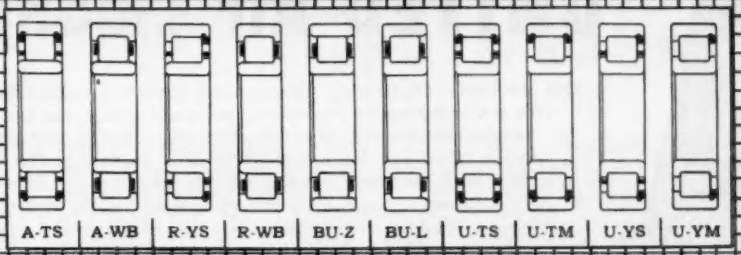
Sunicut 11W is a low-viscosity, dual-purpose cutting oil for automatics machining all nonferrous metals and free-machining steels such as B1112 or B1113. Its transparency permits quick and accurate miking. It will not stain brass or copper under normal conditions. It drains rapidly, minimizing carry-off. And its high lubricating and cooling properties aid in prolonging tool life and improving finishes. Moreover, it protects finished parts from rust and corrosion.

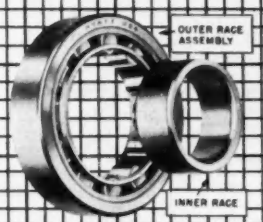
Other Sun cutting oils offer similar opportunities for improved operations and economy. For information about them, or the help of a Sun representative, use the coupon.

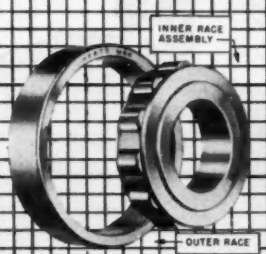
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SUNOCO

HYATT HY-LOAD wide variety permits exact selection of bearing type and size









HERE are the ten different types of Hyatt Hy-Load Roller Bearings. Four of these are constructed with separable inner races, two have separable outer races and four are non-separable. And each type is built in several widths and in a wide variety of sizes—a Hyatt Hy-Load for every radial bearing application need.

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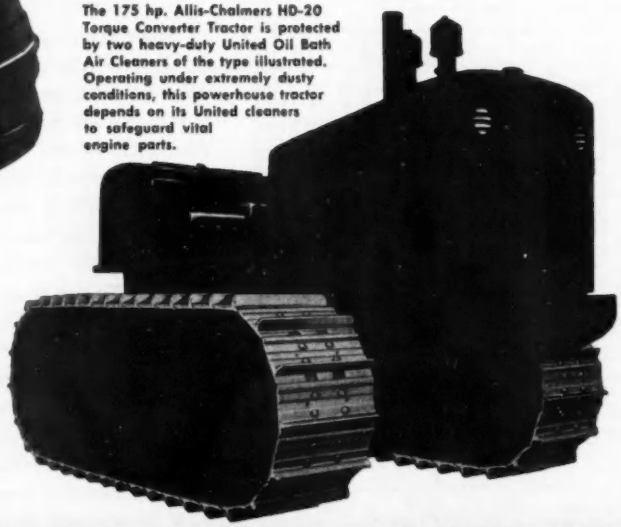
UNITED Air Cleaner



This new United Oil Bath Air Cleaner which protects the Allis-Chalmers HD-20 engine provides a three-point safeguard against dust and other engine abrasives. The first is the pre-cleaner which removes a major portion of airborne dust before it reaches the air cleaner. The second and third are in the newly designed oil bath element of the air cleaner. Here two separate, removable filter elements have replaced the single, fixed cleaning element. These dust-trapping units are easily removable for thorough cleaning and servicing, thus assuring operation of cleaner at top efficiency at all times.

Under test conditions far more severe than are encountered during average working conditions, this new United Oil Bath Air Cleaner removed over 98.6 percent of harmful dust and abrasives from air entering engine.

United air cleaner engineers working closely with customers' technicians are constantly providing new, improved air cleaner designs for a wide variety of internal combustion engines.



The 175 hp. Allis-Chalmers HD-20 Torque Converter Tractor is protected by two heavy-duty United Oil Bath Air Cleaners of the type illustrated. Operating under extremely dusty conditions, this powerhouse tractor depends on its United cleaners to safeguard vital engine parts.



Exploded view showing new air cleaner with removable filter elements. These easily removable discs can be taken out, serviced and replaced with a minimum of effort and time.

UNITED SPECIALTIES COMPANY

United Air Cleaner Division — Chicago 28
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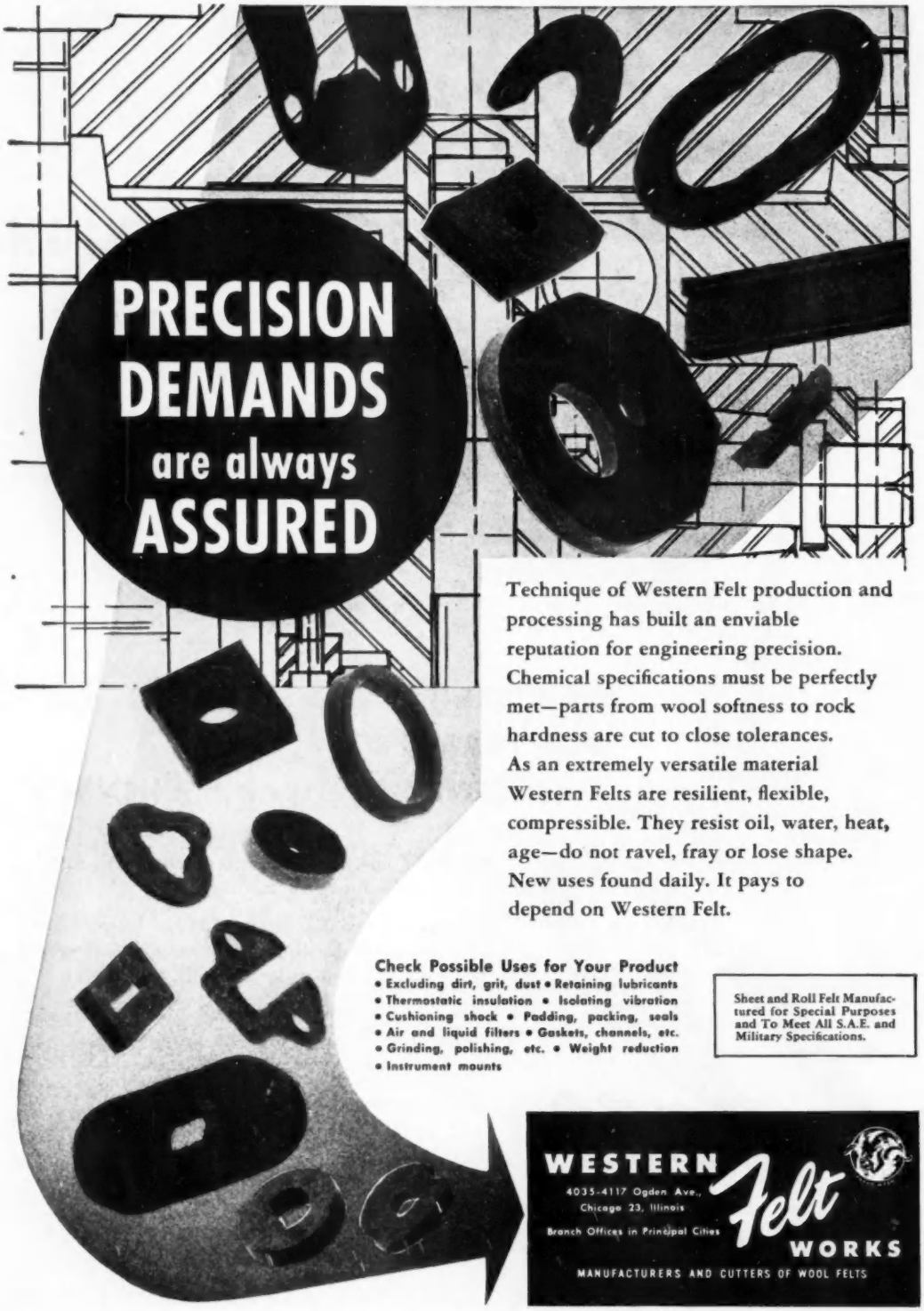
Whatever the steering job may be—buses, trucks, passenger cars, boats, tractors, shovels, cranes, graders, etc.—*Ross* assures *ease, safety* and *economy.*

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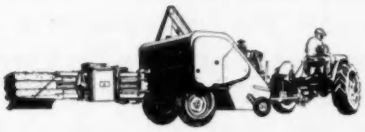
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Here's a "Hy-Power" machine that punches as many as 16 holes *at once* in the structural steel sections that make up the sturdy frame of the world-famous New Holland Machine Company hay baler.

This simple, versatile and inexpensive unit—designed by New Holland engineers—makes possible economical, precision, multiple-hole punching of even short runs. Individual cylinders are easily and quickly positioned to meet different job specifications . . . then connected to convenient openings in the pressure and return lines.

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OUR BULLETIN 150 TELLS
the complete story of Hannifin "Hy-Power" Hydraulics. Your copy sent on request.

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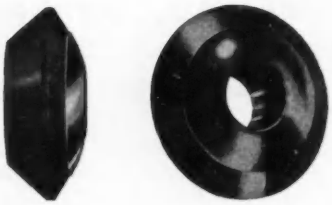
Proved in many fields, "Hy-Power" Hydraulics can provide better, faster production and performance for one-of-a-kind specials like this or for the machines you may build repetitively. Why not investigate this equipment that permits applying forces up to 100 tons . . . in any direction . . . simultaneously? Why not learn all about the nearly 100% salvageability of "Hy-Power" components when set-ups must be changed? A Hannifin representative will explain how you can utilize "Hy-Power" for punching, riveting, staking, bending or crimping operations. Hannifin Corporation, 1143 S. Kilbourn Ave., Chicago 24, Ill.

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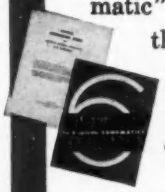
MACHINING FACILITY IS TANGIBLE



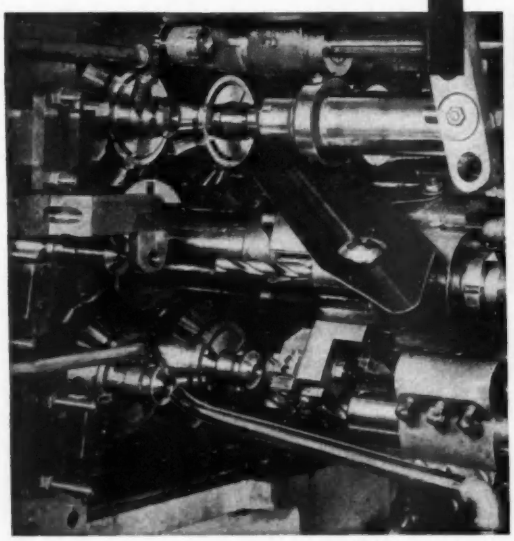
In the production of alloy steel bevel gear blanks on a 2⅝-SIX CONOMATIC, the "all position" endworking attachment facility simplifies the face and hole burnishing operations.

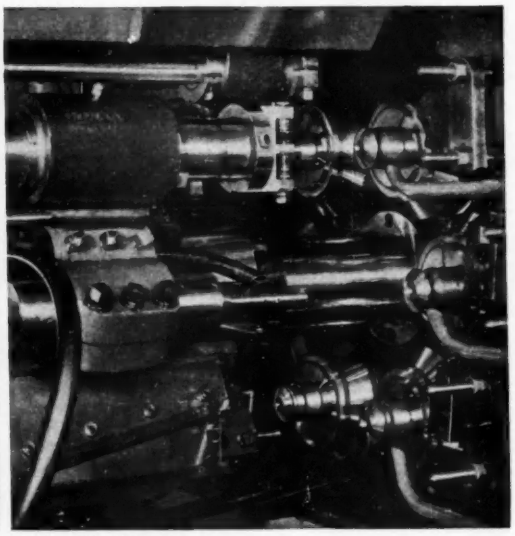
"AUTOMATICS" are good examples of mechanized teamwork. Their main function is to follow through and keep running. But a weak frame, a cramped tooling area, or an inadequate tool support, of one machine alone, can lower the production average of an entire battery.

The extra values that pay off in an "automatic" are not just *wished* into the machine; they are *built* there. And only complete information will disclose whether or not they *are* built there. You may have complete information on CONOMATICS.

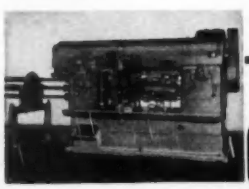


A Comparison of ALL Automatics is in favor of Cone





FRONT AND REAR SIDES OF TOOLING AREA



Conomatic} CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.



Squeezed like an accordion, welded tubing demonstrates uniform strength

● This compression folding of a section of electric-welded steel tubing produces no cracks or flaws. Such uniform strength is proved in many other severe cold forming operations. U. S. Bureau of Standards tests show that the weld is as strong as the wall, and that it has the same qualities as the steel.

Investigate the economy and physical advantages of Brainard welded steel tubing in *your* products. Write Brainard Steel Division, Dept. W-11, Griswold Street, Warren, Ohio. An integrated producer; offices throughout the U. S.

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SHARONSTEEL
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WELDED STEEL TUBING

THE INDUSTRY'S FINEST POWER BRAKING SYSTEMS

Star Performers

IN THEIR FIELDS!

In any field of endeavor, consistently good performance is the only road to success. And that is precisely why Bendix* Hydrovac* and Bendix Air-Pak are the recognized leaders in the power braking field. More than two and a half million installations and billions of miles of service have proven Hydrovac the unchallenged leader in the field of vacuum-hydraulic braking.

Air-Pak, similar in design and principle to the Hydrovac, has by its outstanding performance established itself as the industry's foremost air-hydraulic power brake unit.

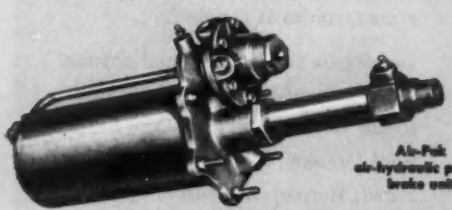
Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and air actuated units, brakes can be applied instantly by foot power alone—a constant safety factor of importance.

Regardless of size of vehicle or whether the preference is for vacuum or air actuated brake, for consistently good performance, it pays to specify Bendix Hydrovac or Bendix Air-Pak—the industry's Finest Power Braking Systems. *REG. U. S. PAT. OFF.

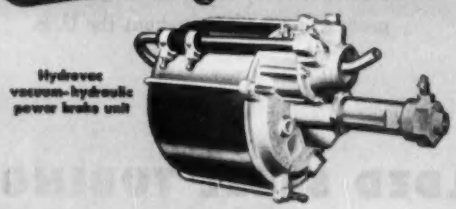
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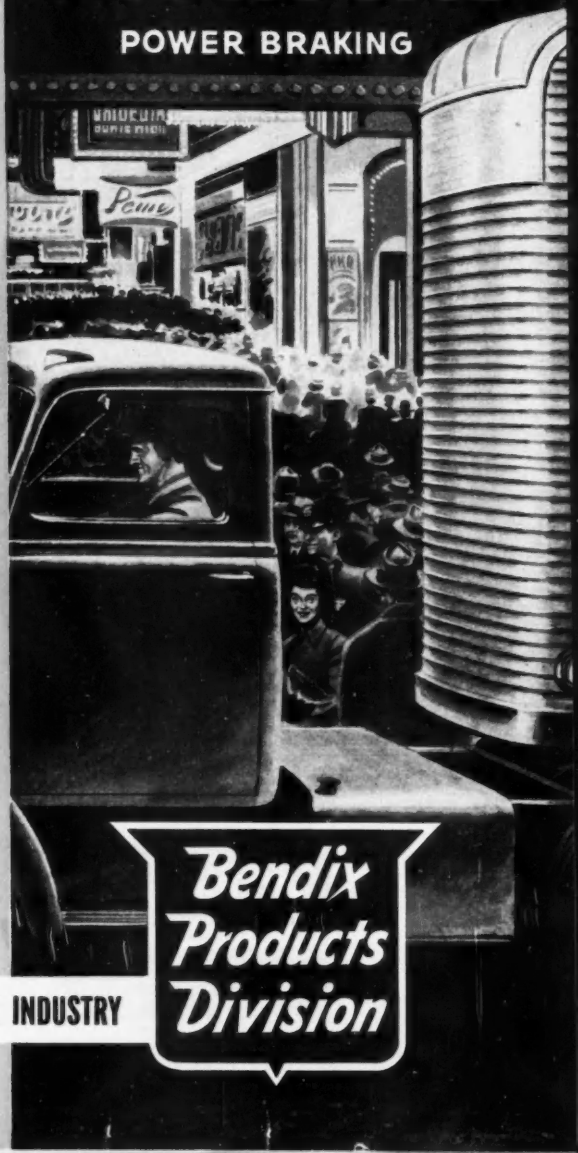


Air-Pak air-hydraulic power brake unit



Hydrovac vacuum-hydraulic power brake unit

FEATURING ★ **AIR-PAK HYDROVAC** POWER BRAKING



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High Spots of This Issue

★ **Greater Emphasis on Automation in Stamping Production**

Industry interest in automation, a vital key to the attainment of more manufacturing efficiency, has grown to tidal-wave proportions. Presented here is an account of how Ford Motor Co. uses it at the new Buffalo stamping plant. Page 34.

★ **Paris Automobile Show Sets New Records**

A truly international transportation panorama, the Paris Show this year shattered all previous marks for size and attendance. Details of latest cars and commercial vehicles on display are to be found in this eye-witness report. See Page 42.

★ **Technical Highlights at Metal Show**

Pinpointed in this review of the most gigantic exposition of its kind ever held are new developments of special interest. Complementing the story of the show itself are abstracts of several papers presented at the technical sessions. Page 46.

★ **The Machine Tool Market in Latin America**

The demand for U. S. machine tools "South of the Border" is a hungry one, due largely to the vast industrial expansion there in recent years. Characteristics of the market and the problems it involves are thoughtfully analyzed. See Page 48.

★ **British and German Machine Tool Expositions**

This special report by Joseph P. Crosby, vice-president of The Lapointe Machine Tool Co., contains a wealth of information on the latest foreign machine tool developments. Notes on the European production situation are included. Page 55.

★ **33 New Product Items And Other High Spots, Such As:**

French gas turbine tested in sports car; coating metals with aluminum by the Mollerizing process; automotive and aviation packaging wins awards; Timken-Detroit's new axle and gear plant; Z-F differential features automatic locking; new piston holds clearance at all operating temperatures; 1952 vehicle registrations up 2.6 per cent over 1951; door latch rotor now stamped successfully; and lamps for 12-volt electrical systems.

Automotive and Aviation News, Page 17
Complete Table of Contents, Page 3

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

A man who can help you get STEEL!



In these days of great demand, the help of an experienced steel man is especially valuable. Did you realize that the services of such a man are available to you without cost or obligation? This man is your Ryerson steel service representative—a specialist in getting available steel to you quickly.

He cannot make steel, of course, but he does have up-to-the-minute information on our stocks at his finger tips. He does have years of steel experience that often enables him to recommend practical alternates when the steel you need is not on hand. And he does know every phase of Ryerson service from testing for quality to dependable delivery, including heat treating, sawing, shearing, flame cutting or otherwise preparing steel to your particular requirements.

He represents, and has the wholehearted support of, the largest steel-service organization in the world. Working closely with him are Ryerson engineers, metallurgists—authorities on carbon, alloy and stainless steels—ready for quick cooperation on unusual problems.

While we have thousands of tons of steel on hand for immediate shipment, it is spread among 15 plants from Boston to Seattle. And the recent steel strike, plus continued heavy demand, has unbalanced our stocks badly as to sizes and types. We believe this is the situation throughout the industry.

But your Ryerson service man is always ready to assist you . . . ready to help you scour the country from coast to coast to get the steel you need. So, talk over your steel problems with him the next time he calls.

PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled and cold finished

STRUCTURALS—Channels, angles, beams, etc.

PLATES—Many types including Inland 4-Way Safety Plate

SHEETS—Hot and cold rolled, many types and coatings

TUBING—Seamless and welded, mechanical and boiler tubes

ALLOYS—Hot rolled, cold finished, heat treated. Also tool steel

STAINLESS—Allegheny bars, plates, sheets, tubes, etc.

MACHINERY & TOOLS—For metal fabrication

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 107, No. 10 November 15, 1952



NEW DESOTO FOR 1953

New body styling features the 1953 DeSoto line, of which the club coupe shown above is representative. Engineering changes include a new recirculating heating system mounted beneath the new cowl vent opening, splayed rear springs, redesigned carburetor, low friction roll pivots in clutch linkage, 16-spline axle shaft end, vented fuel tank filler neck, and one rear and two front engine mounts.

Packard to Re-enter Luxury Car Field

Packard Motor Car Co. is moving aggressively to recapture a position of dominance in the high priced automobile field that it once held. It is broadening its line to include high priced and custom built luxury cars and will reintroduce the Packard Clipper name for the medium priced field. The Packard name will be applied to the highest priced line which will include custom built cars, including chauffeur driven models priced up to $6900. Packard once dominated that field but it has not been active in that market in recent years. An intensive advertising campaign will be launched to promote the sale of the luxury line.

Packard also will aggressively pursue the medium priced market with a Clipper line, reinstating the name which was first introduced in the 1930's and dropped after the war. The company will spend the equivalent of its total 1952 advertising budget to merchandise the Clipper, about $5 million, and $3 million for the luxury line. It is believed Clipper will develop into a generic name, rather than just a model designation, with styling different from the Packard line.

In keeping with its intensive sales drive, Packard plans to increase schedules substantially over 1952 levels next year and is in the process of increasing its dealer body by 25 per cent. A production of 120,000 cars next year is hoped for, compared to about 65,000 this year. About one-third of the company's volume is expected to be in the top price class.

J. J. Nance, Packard president, says that extensive research shows the high priced car market has expanded beyond the industry's recent production in that field because of greater purchasing power and the larger number of families with annual incomes of more than $10,000. He says the proportion of cars in the medium and upper priced class has increased from 14 to 28 per cent during the past decade.

Packard will market a sports car designed to sell for about $5000 next year. Mr. Nance revealed that the car will be a five-passenger model with a fabric top, will have wire wheels and will resemble the Pan American model shown to the public recently.

Federal Truck Merges with Fawick Airflex

Stockholders of Federal Motor Truck Co. of Detroit and Fawick Airflex Co. of Cleveland have approved merger of the two companies. The new company will be called Federal Fawick Corp. with executive offices in Cleveland and operating divisions in Detroit and Cleveland. T. L. Fawick, founder of the Cleveland firm, will be chairman of the board and chief executive officer, and R. S. Huxtable, Fawick executive vice president, will be president. George H. Hammond, president and general manager of Federal Motor Truck, will be executive vice president and will head the Detroit division. The new company will have a net worth of more than $5.5 million and manufacturing facilities of approximately 550,000 sq ft. Prior to the merger Fawick Airflex had developed a new type truck brake which has been tested and approved by the Army.

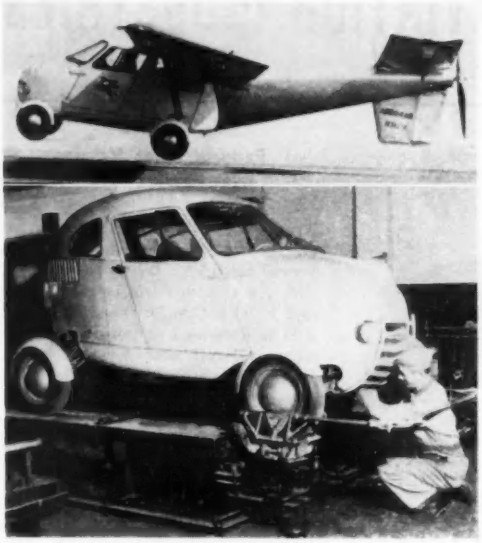
All Nash Cars May Have Turn Signals

Nash Motors, Div. is seriously considering including directional signals on all its 1953 models as standard equipment. It is not clear yet whether it would be priced as an accessory or absorbed into the total price of the car. The latter method, of course, would require OPS approval. Currently, four states—New York, New Jersey, Minnesota, and New Hampshire—require directional indicators on all new cars sold.

Air-Conditioning Delayed

Although Chrysler Corp. has developed an air-conditioning unit for automobiles, tooling problems have delayed start of production. The unit will be manufactured as soon as the tooling job can be completed.

News of the AUTOMOTIVE



FLUID DRIVE

The Aerocar flying automobile, powered by a Lycoming 135 hp engine, is said to cruise at 110 mph in the air, hit 85 mph on the road, where fluid drive is used. Here an automobile mechanic checks wheel alignment.

General Tire Bids for More Crosley Stock

General Tire and Rubber Co. has offered to buy 185,251 shares of Crosley Motors, Inc., from the remaining stockholders. General acquired about 56 per cent of the stock last July and if its current offer is accepted, will control about 88 per cent of the common stock. General is offering to pay $1.50 a share in cash or to trade one share of General Tire common stock for 21 shares of Crosley. General had said that it has no plans to revive manufacture of the Crosley automobile, suspended several months ago, but that it possibly might sell manufacturing rights to the car if a buyer can be found. It is reported that two or three groups are looking at the Crosley deal with a view toward building a small sports car.

Reo Earnings Show Substantial Gain

Earnings of Reo Motors, Inc., for the first nine months of this year totalled more than $2.6 million, a substantial increase over the approximately $1.8 million earned in the same period of 1951. The excellent showing is attributed to the continued high production of 2½ ton military trucks and "Gold Comet" engines.

Studebaker Earnings Ahead of Year Ago

Although sales for the first nine months of this year were substantially the same as those in the same period a year ago, net earnings of Studebaker Corp. showed an increase. Profit for the first three quarters of this year was nearly $9.3 million compared with about $8.8 million in the corresponding period a year ago. Third quarter earnings this year, however, totalled only $512,288, or less than half the total of the same quarter a year ago.

Clark Engineering Head

A. O. Williams has been named director of engineering for the Industrial Truck Div. of Clark Equipment Co. He will coordinate and head all of Clark's engineering activities in the materials handling equipment field. He has been associated with Clark since 1917.

Republic, Northrop Report Income, Sales

Net income of Republic Aviation Corp. for the nine months ended Sept. 30 after provision for federal income taxes, excess profits taxes and New York state franchise taxes, amounted to $4,190,111, equivalent to $4.17 a share. In the corresponding period a year ago the company reported net income of $2,141,407, or $2.13 a share.

Sales of the company for the nine months amounted to $215,302,294 compared with $83,077,697 in the similar period a year ago. Unfilled orders at the end of September, this year, were in excess of $1 billion compared with $550 million at this time a year ago.

Sales of Northrop Aircraft, Inc., in the fiscal year ended July 31 exceeded the volume reported for any previous year in the company's history, according to the firm's annual report. Sales and other income amounted to $187,456,926, a gain of 109 per cent over the $89,947,629 total in the 1951 fiscal year. Operating profit before taxes increased sharply from $3,758,053 in 1951 to $7,485,440 in 1952, but final net income for the 1952 fiscal year was lower after providing $5,083,150 for federal income and excess profits taxes.

Packard Shows Small Third Quarter Net

Although the steel strike knocked out five weeks of production during the third quarter, Packard Motor Car Co. showed a profit during the three months period because of uninterrupted September production. The company reported net income for the first nine months of this year of $3,094,515, indicating third quarter earnings of about $3000. In the first nine months of 1951 Packard reported a net of $4,922,876. Because of increasing shipments of Diesel engines, shipments of jet engines to the Air Force, and automobile production picking up after the model changeover, the fourth quarter will be the highest earning period of the year, according to J. J. Nance, president.

AND AVIATION INDUSTRIES

G.M. Earnings Show Gain from Year Ago

General Motors Corp. has reported net income of $387 million for the first nine months of this year compared with $373 million for the same period a year ago. Although defense sales for the first nine months of this year totalled more than $1 billion, or 2½ times greater than for the same period a year ago, civilian sales dropped from approximately $5.1 billion to $4.5 billion, with the result that combined civilian defense sales for the period this year totalled $5.564 billion, down slightly from the $5.6 billion in the like period of 1951. Because of the steel strike, third quarter sales were down 18 per cent from the second quarter but about equal to the third quarter a year ago. Net income, however, was up to $118 million compared with $93 million for the same quarter a year ago.

General Motors sold 1,600,411 vehicles from U. S. plants in the first nine months of this year compared with 2,250,989 units in the corresponding period a year ago. Vehicle sales from all General Motors plants, U. S. and foreign, totalled 1,898,888 units compared with 2,527,291 during the corresponding 1951 nine months. Passenger car production in G.M. plants in the U. S. totalled 1,293,290 compared with 1,800,282 a year ago.



SIATA SPORT

A Fiat V-8 engine powers this new Siata two-passenger coupe. A special transmission provides five speeds forward and reverse. The chassis is of elliptic tubular construction, and the wheelbase is 2400 cm (94.5 in.). Running gear is similar to the Fiat coupe, described in AUTOMOTIVE INDUSTRIES for May 1, page 53.

Automobile Builders and Suppliers Have Many New Devices Coming

Several interesting developments in the parts and accessories field have been shown in connection with the new car announcements, or are due shortly. Others were divulged at the many technical meetings held in the past few weeks.

Chrysler Corp. at its national press preview of 1953 models also included displays of products of its smaller divisions. Amplex Div. introduced a line of steel powder parts having the characteristics of SAE 1020 steel, and capable of being hardened to improve wear properties. Airtemp Div. demonstrated its car air-conditioning system which will be offered in the Chrysler and DeSoto lines. Among its principal features is provision for entry of fresh air into the system. The four-cylinder compressor is capable of supplying refrigeration at the rate of 1½ tons per hour at speeds around 25 mph.

An exhibit of Cycleweld Div. products included structural type cements, cements and sealers used in body and trim construction, and an impressive line of corrosion resistant compounds for protecting service and military parts. These include strippable coatings, hot dip wax, and rust preventatives of various types. In addition, this division shortly will market a chromium cleaner and a chromium protective wax. The wax, which may be applied on buffing wheels in production, will coat the bright work with a tenacious protective coating

(*Turn to page* 185, *please*)

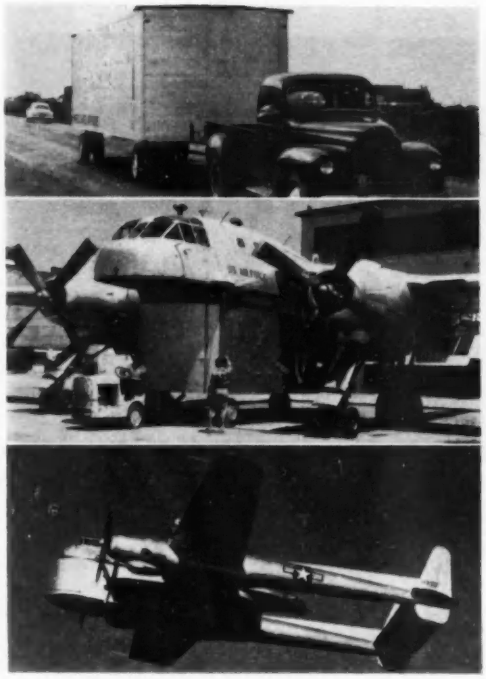
K-F Loses Appeal In Stock Suit

Kaiser-Frazer Corp. has lost the latest round in its long and costly legal battle against Otis & Co., Cleveland investment firm, growing out of the abortive K-F stock issue of 1948. The U. S. Supreme Court has denied hearing an appeal which sought reinstatement of a damage award totaling more than $3 million against Otis & Co. Originally K-F was awarded the damages in a U. S. District Court but the U. S. Circuit Court later ordered the case dismissed. The Appeals Court at that time ruled that K-F had misrepresented its earnings and that the contract was "so closely related to the performance of acts forbidden by law as to be itself illegal."

Hudson Net Shows Sharp Increase

Earnings of Hudson Motor Car Co. for the nine months ended Sept. 30 showed a sharp increase, totaling $6,249,145. In the same period a year ago, the profit was $967,378.

News of the AUTOMOTIVE



AIRLIFT

This new flying trailer is a detachable cargo compartment for the Fairchild XC-120 Pack Plane. Payload is about 10 tons. Wheels and tow bar are carried inside in flight. Front and rear doors fold flat for highway travel, and lock in a V shape when trailer is attached to the XC-120.

Chevrolet Shell Plant In High Production

Chevrolet Div. has completed its seven millionth artillery shell at the plant it operates in St. Louis, Mo., under an Ordnance contract. Production started June 8, 1951, and the original contract was doubled last December. Chevrolet operated the plant during World War II.

Ordnance Awards to ACF-Brill, Autocar

The Hall-Scott Motor Div. of ACF-Brill Motors Co. has been awarded a contract by the Ordnance Dept. totaling $2 million for the manufacture of shells. In addition, $700,000 was awarded for shell manufacturing facilities. These new contracts awarded by the Army bring ACF-Brill's backlog of unfilled orders to approximately $29.7 million. The major part of these orders are due for delivery by the end of the year.

The Autocar Co. has been awarded a $1.02 million contract from the Philadelphia Ordnance District to rebuild trucks for the government. Autocar already has received the first group of vehicles at its warehouse at Exton, Pennsylvania. The vehicles are being completely torn down and rebuilt at the Ardmore, Pa., plant.

Stockholders of the Autocar Co. recently approved the purchase of a controlling interest in the Highway Trailer Co. of Edgerton, Wisc. Under the terms of the transaction, 29,344 shares of Autocar common stock will be exchanged for 352,124 common shares of Highway Trailer.

Murray Adds Screw Firm

Murray Corp. of America recently bought assets of the Triplex Screw Co., Cleveland, O. Triplex makes several types of fasteners, and its acquisition was described as part of the Murray diversification plan.

Planes, Engines Ordered by Military

Recent orders were placed for fighters, training planes, and jet engines. The Navy contracted for an unnamed number of T-28B training planes with North American Aviation, Inc. The T-28B is similar to the Air Force T-28A, but has a Wright R-1820 engine rated at 1425 hp as compared to 800 hp in the present model. Curtiss-Wright Corp. received a second large order for the J-65 Sapphire turbojet engine, but no details of the contract were revealed. The Navy will use the engine in a new, secret interceptor.

The Air Force announced an undisclosed number of F-100 jet fighters have been ordered from North American Aviation, Inc. Data on configuration and performance were withheld, but it has been reported to display a more radical sweepback than the F-86D.

Recently the Navy revealed the successful first flight of its first swept-wing jet attack aircraft, the Douglass A3D. The Air Force accepted from Boeing Airplane Co. the XB-52 Stratofortress, second of the eight-jet heavy bombers to fly, for a flight test and evaluation program.

First public hint of specifications for its jet transport came when Lockheed Aircraft Corp. president R. E. Gross displayed plans for the new swept-wing airliner to Capt. Eddie Rickenbacker, president and general manager of Eastern Air Lines. Designed to carry more than 100 passengers at speeds approaching 600 mph, the new ship would cruise between 30-40,000 ft.

AMA Veteran Retires

Retirement of Kenneth A. Moore as general traffic manager of the Automobile Manufacturers Association after 32 years' service was announced last month. Carman E. Brown, who joined the staff of the association in July 1952, will succeed Mr. Moore. Mr. Brown previously held the position of traffic manager of the Armor Plate Div., Standard Steel Spring Co. Earlier, he had been a supervisor in the traffic department of Reo Motor Car Co.

AND AVIATION INDUSTRIES

Wide-Range Oil Revealed by Standard Laboratories

A new type premium motor oil was announced recently for use under extreme weather conditions. Named Uniflo by the Standard Oil Development Co. (N.J.), the new oil has a high viscosity index and meets SAE viscosity classifications for lubricating oils from SAE-20 to 5W. Manufacturers recommending the new oil indicate its use from 110 F to —25 F.

Ultimate octane requirements of new high-compression gasoline engines using the new oil were reduced as much as one-third, or by as much as four octanes. The combination of additives with the particular base stock used reduces initial buildup of combustion chamber deposits on new engines. Uniflo will be available in the Esso marketing area about Dec. 1, and will cost about 50 per cent more than present premium grades.

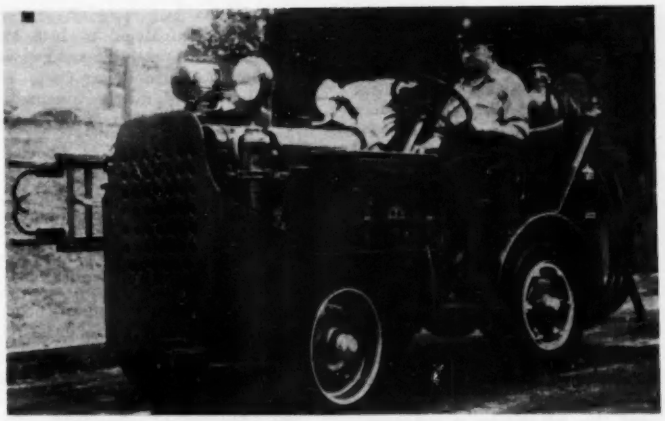
Spicer Plant to Stay Open

Previous plans of the Spicer Div. of Dana Corp. to move its Pottstown, Pa., plant out of the State were shelved recently. An agreement between the company and the UAW (CIO), details of which were not announced, forestalled the contemplated move. Previously the company had announced it could no longer do business profitably at the present location. The $10 million plant employs 2000 persons and manufactures automobile parts.

Four Firms Licensed for Al-Fin Process

Wider application of the Al-Fin process of joining aluminum and its alloys to steel and cast iron, or to nickel and titanium, was indicated recently. Two additional firms in this country and two abroad have been licensed to use the manufacturing technique by the Al-Fin Div. of the Fairchild Engine and Airplane Corp.

This brings to 18 the number of companies licensed by Al-Fin, according to a Fairchild spokesman. He stated that the latest licensing agreements have been signed with Thompson Products, Inc., Cleveland, O., and St. Catherine's, Ont., Canada; National Steel and Shipbuilding Corporation, San Diego; Etablissements J. Floquet, Courbevoie (Seine), France, and W. & W. Schenk, Maulbronn, Germany.



PLANT FIRE TRUCK

A plant fire truck for narrow factory aisles was designed by plant protection officials of the Chevrolet Div. Baltimore plant. A Clark model C7-21 Mule was fitted with an Ansul S-150 dry chemical extinguisher behind the driver's seat, and two 20-B hand extinguishers on each front fender. The unit also carries a 20-ft ladder, breathing apparatus, boots, rope, axes, siren, searchlight, and two smaller extinguishers.

Low Pressure Tire for Aircraft Announced

Development of a new aircraft tire, which may be used for both military and commercial aviation, has been announced by the General Tire & Rubber Co. This low-pressure, extra-wide tire was developed by General under a contract with the Air Force. It was designed to fulfill the requirement for a tire with improved flotation—a tire able to maintain mobility in soft terrain without digging in and bogging down aircraft.

The new General Aircat measurements are 36 x 20.00-16. In laboratory tests conducted by General, this new tire withstood more than 500 stops on the test wheel—displaying two and a half times the durability required by Air Force specifications. At Wright Air Development Center, the Aircat successfully passed laboratory dynamometer tests. It showed superior flotation qualities during actual landings, take-offs, and taxi tests.

New Standard Thomson Plant Set for Dayton

Standard Thomson Corp. has started construction on a new plant at Dayton, O., to increase its aircraft parts production capacity. The new plant will cost an estimated $1.5 million and will add 115,680 sq ft of production space to the company's existing seven plants in Dayton. The expansion marks completion of the company's program, which included acquiring plants in Boston, Mass., and in Burbank, Calif., earlier this year. The company has a $13 million backlog of defense orders.

Battelle Institute Plans German Lab.

Battelle Memorial Institute will build a new research laboratory at Frankfurt-am-Main, Germany. It will be the Institute's first full scale foreign expansion and is estimated to cost about $1.5 million for the building and equipment. It will concentrate on chemical, metallurgic, and engineering research to several German industries. The Institute also will establish another research center at Geneva, Switzerland.

News of the AUTOMOTIVE

Time Cycle Bars Mass Plastic Body Output

Despite considerable discussion about plastic automobile bodies they still are nowhere in sight so far as mass production is concerned. Production time requirements alone rule out their acceptance at the present state of development, since curing time is an impossible obstacle to mass production techniques. They might have value, however, for models used in testing new designs or perhaps to test public reaction to styling features. Glasspar Co. recently showed a sports car with fibre glass plastic body to automobile manufacturers in Detroit. The company currently is building one body a day but could expand this production to ten a day. The operation is on a strictly custom basis, supplying sports bodies for standard automobile chassis. The plastic bodies are made by laminating fibre glass sheets with a polyester resin in a large mold.

Moore Made President of F. L. Jacobs Co.

Neil A. Moore, formerly vice president of Federal Mogul Corp., has been elected president of F. L. Jacobs Co., Detroit. He succeeds Clare S. Jacobs, who has resigned. Before joining Federal Mogul in 1948 Mr. Moore was vice president and general manager of Sealed Power Corp. He has been active in the automotive parts industry for 30 years.

Armed Forces at ASI Show

The atomic submarine will share space with automotive parts, equipment, accessories, and tools on display at the Automotive Service Industries show in Atlantic City, N. J., Dec. 10-13.

Under Navy auspices, a schematic working model of the submarine, presently one of the nation's top secrets, will be unveiled for the first time. Other armed forces exhibits include a model of the H-bomb under manufacture; specimens of navy bombs, rockets, mines, and projectiles; numerous jet and turbojet engines; a scale model of the Oak Ridge uranium plant; the snorkel Jeep, an amphibious version now successfully used by the Marine Corps.; and a collection of Communist weapons captured by the Marines in the Korean fighting. Besides these there will be a pictorial presentation of the development of atomic energy, its peace and war time uses.

I-H Adds Hough Co. as Subsidiary

International Harvester Co. has acquired all the outstanding stock of Frank G. Hough Co., which manufactures earth moving and material handling equipment. Hough as of Nov. 1 became a wholly owned subsidiary of International. No immediate changes in organization are contemplated and F. G. Hough will continue as president. The company is located at Libertyville, Ill., on a 110-acre site and includes a plant with 300,000 sq ft of floor space.

Parker Rustproof Opens N. J. Plant

Parker Rustproof Co. has opened a new $200,000 plant at Mountain View, N. J. The 15,000-sq ft factory will produce rust-proofing products for surface treatment of metals with most of its output going to the metal working industry on the east coast. Opening of the new plant completes the company's expansion program.

NADA Plans to Fight For Lower Car Taxes

The National Affairs Committee of NADA is planning an aggressive campaign aimed at reducing excessively high taxes on automobiles. The program is being formulated and will be ready for action when tax revision next is considered in Congress. National, state and local taxes paid by motorists have more than doubled during the past decade, whereas total vehicle registrations have climbed less than 50 per cent during the same period. It is estimated that taxes paid by vehicle and parts manufacturers last year exceeded the wholesale value of two million average priced new cars.

Chrysler Spent $200 Million

Chrysler Corporation reports that cost of design, engineering, and tooling for its 1953 models totals about $200 million. Changes include completely new bodies for all lines and a new engine and chassis for Dodge.

1952 U. S. PASSENGER CAR PRODUCTION

(As reported by the car factories)

	October 1952	September 1952	October 1951	Ten Months 1952	Ten Months 1951
Chrysler	11,210	3,398	13,648	92,195	143,637
De Soto	5,705	9,473	9,710	74,282	104,648
Dodge	21,574	20,003	24,502	193,891	282,549
Plymouth	30,565	52,443	42,728	363,464	548,759
Total—Chrysler Group	69,054	85,317	90,588	723,832	1,080,593
Ford	103,824	81,711	79,663	620,383	790,031
Lincoln	1,732	4,125	2,390	26,711	24,501
Mercury	23,042	15,099	20,585	149,760	208,774
Total—Ford Group	128,598	100,935	93,638	796,774	1,023,306
Buick	35,642	34,342	33,024	272,752	356,188
Cadillac	10,868	9,818	8,770	84,092	90,612
Chevrolet	114,134	100,241	94,741	740,575	977,657
Oldsmobile	26,696	24,536	23,540	193,922	251,574
Pontiac	32,844	29,539	26,154	234,242	300,759
Total—G. M. Group	220,184	198,476	176,229	1,526,183	1,976,787
Kaiser-Frazer Group	8,612	6,966	5,436	59,428	91,173
Hudson	3,712	6,740	6,922	64,681	88,011
Nash	18,875	17,543	12,340	120,723	139,599
Packard	4,383	5,706	4,570	48,613	64,708
Studebaker	21,132	14,277	19,562	132,166	197,935
Willys	6,406	5,776	1,917	44,539	24,776
Total—All Makes	490,966	441,816	411,222	3,616,941	4,686,983

AND AVIATION INDUSTRIES

Bendix Delivers New Jet Starter

Delivery of the first mass-produced combustion self-starter for the latest jet planes was announced this month by the Bendix Aviation Corp.

The typewriter-size 75-lb starter, which burns a mixture of high-pressure air and jet fuel, develops 340 hp. It is said to provide the first means of starting large jet powerplants with a completely airborne, self-contained unit operating independently of ground crews. It develops and expends its power in 3½ sec, the company said.

Record for Kropp Forge

Net sales and income of Kropp Forge Co. and its wholly owned subsidiaries, Kropp Steel Co. and Kropp Forge Ordnance Co., set new all-time records for the fiscal year ended July 31, 1952, according to the annual report.

Net income after Federal income and excess profits taxes and provision for the company's contribution to the employees profit sharing fund was $759,583 or 70.6 cents per share on the 1,075,814 common shares outstanding. This compares with net income for the previous fiscal year of $739,798 or 73.9 cents per share on 1,000,000 common shares then outstanding. Net sales rose 83.7 per cent to $27,307,198 from $14,862,256 reported last year.

Trailmobile Announces Telescoping Trailer

A military truck-trailer whose telescopic side-walls can be expanded quickly to convert the interior of the trailer into a room has been developed by Trailmobile Inc., a subsidiary of Pullman Inc.

In transit, the new expansible trailer is only eight ft wide, thus conforming to laws regulating vehicle widths. On arrival at its destination, however, one man with a hand-crank, can extend the side-walls of the trailer until its overall width is 171 in. The trailer is 20 ft long inside. Six stabilizing jacks are placed under the extended sides of the trailer when stationary.

First units of the new expansible trailer are to house and transport Link aviation trainer devices for the use of the Air Force.

California Rivals Detroit in Automobile Production

One in every ten of the estimated 5.3 million automobiles produced this year in the United States will roll from assembly lines of plants located in Los Angeles County, according to a recent estimate. California in 1952 will produce about 850,000 cars and trucks. Of these 550,000 will be made in Los Angeles County, ranking it second only to Detroit, in auto output. The rest of California's output will be built in the San Francisco Bay area. A recent survey by the Los Angeles Chamber of Commerce disclosed that automotive plants here employ 24,000 people and assemble more different makes of cars than do plants in Detroit.

Hardtop Record

Buick Motor Div.'s output of hardtop convertibles amounted to 27.1 per cent of total production for the first nine months of 1952, an increase of nearly seven per cent over the corresponding period in 1951. This is believed to be a record and gives Buick a substantial lead over other manufacturers producing this model.

(*Turn to page* 186, *please*)



HONORED

Named one of the Women of Achievement, Mrs. Helene Rother will have her portrait hung in the Detroit Historical Museum. Mrs. Rother is consultant designer for Nash-Kelvinator Corp. and was one of the first women to hold such a position in Detroit.

1952 MOTOR VEHICLE FACTORY SALES*

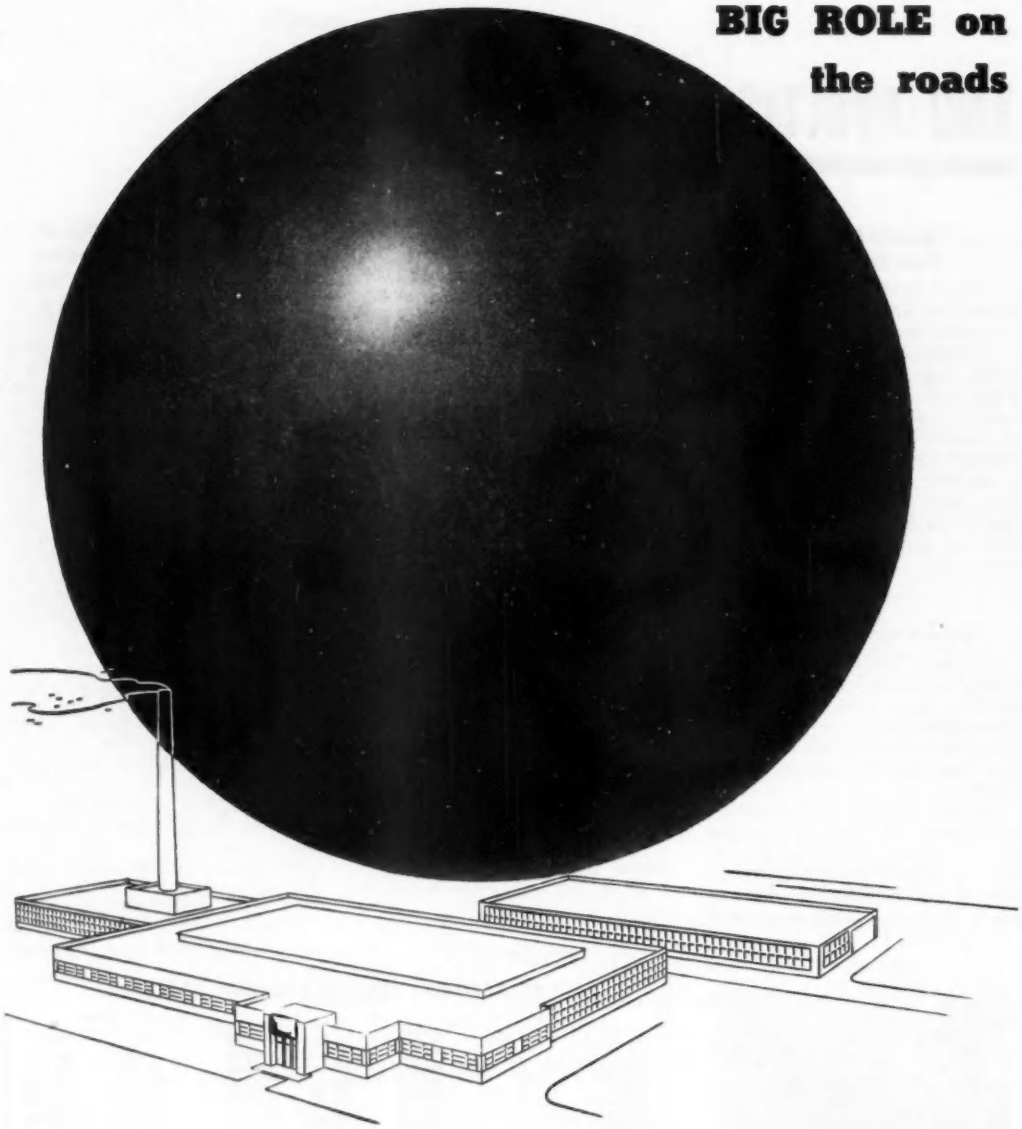
	Passenger Cars	Trucks	Buses	Totals 1952	Totals 1951
January	273,639	100,903	778	375,410	606,833
February	334,056	100,533	625	435,216	618,321
March	373,237	109,167	569	482,973	756,022
April	416,185	112,833	997	529,585	639,272
May	398,286	105,208	423	503,917	682,727
June	408,700	109,526	484	518,710	617,685
July	168,327	43,231	224	211,782	492,316
August	218,577	52,056	349	270,982	549,707
September	438,397	112,374	387	551,158	476,002
Total—Nine Months	3,029,376	846,921	4,436	3,879,733	5,497,992

1952 MOTOR TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
January	35,060	17,632	5,914	22,409	6,368	9,176	4,234	100,993
February	34,282	18,114	6,251	23,278	5,149	9,132	4,327	100,533
March	39,715	19,462	5,857	24,347	5,662	10,076	5,028	109,167
April	43,383	22,313	5,670	21,998	4,604	10,062	4,832	112,833
May	39,560	22,934	5,678	19,243	4,326	10,033	3,434	105,208
June	43,388	23,755	5,373	19,994	4,242	8,964	3,810	109,526
July	15,950	8,530	1,897	7,010	1,902	5,089	3,273	43,231
August	22,761	9,363	2,057	7,622	1,352	6,177	2,724	52,056
September	51,787	22,305	3,864	17,849	3,416	9,735	3,421	112,374
Total—9 Mos., 1952	324,996	164,598	42,961	163,708	36,651	78,424	35,083	846,921
Total—9 Mos., 1951	479,396	209,135	61,685	215,079	54,064	56,515	31,278	1,128,181

*—Automobile Manufacturers Association.

BIG ROLE on the roads



In the automotive industry, New Departure's role is important, indeed. New Departure "Sealed-for-Life" rear wheel bearings, for instance, require no lubrication by car builder or owner. They cut machining and assembly costs and have an unsurpassed record of dependability, long life and *freedom from service*. This is but one example of the many ways New Departures are employed by the most forward-looking engineers in the industry.

The Great Ball of New Departure symbolizes engineering excellence—and New Departure application engineers and research facilities are always at your disposal. Keep your eye on the BALL to be sure of your BEARINGS!

NOTHING ROLLS LIKE A BALL



NEW DEPARTURE

BALL BEARINGS

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers



Budd Co.—Robert J. Kalbfleisch recently became works manager of the Hunting Park plant.



American Bosch Corp. — Donald H. Spicer was named vice-president of manufacturing sales.



Tuthill Pump Co.—Harry T. Kessler was named president and treasurer to succeed G. B. Tuthill, who is now board chairman.

Spicer Mfg. Div. of Dana Corp.—Appointment of **W. J. Joyce, Jr.**, as clutch sales manager was reported recently.

Joseph T. Ryerson & Son, Inc.—**James M. Mead** was elected assistant vice-president.

Cutler-Hammer, Inc.—**M. R. Brice** has been named division manager, industrial control sales.

ACF-Brill Motors Co.—**Ferdinand J. Stackel** is now executive assistant to the vice-president in charge of government contracts.

Sunstrand Machine Tool Co.—**Howard E. Earl** recently joined the firm as chief engineer in charge of development of pneumatic and magnetic products.

Carborundum Co.—**Joseph S. Imirie** is slated to the newly-created position of assistant to the president.

Bendix Aviation Corp., Radio Div.—**Rear Adm. W. E. Cleaves, U.S.N. (ret.)**, has joined the division as staff assistant to the general manager.

Arma Corp., Manufacturing Div.—**Douglas R. G. Williams** has been made staff assistant.

Worthington Corp.—**C. Robert Maranville** has been elected assistant treasurer.

Fairchild Guided Missiles Div.—**Edwin A. Speakman** recently became general manager.

American Forging & Socket Co.—**Edwin D. Scott** joined the firm recently to head its research and development staff.



G. H. Leland, Inc.—Hans G. Belitz is now sales manager of the firm.

Rinshed-Mason Co.—**V. K. McHugh** is now the advertising and sales promotion manager.

Ternstedt Div. of General Motors Corp.—**Frank O. Riley** was appointed director of commercial product engineering.

Niles - Bement - Pond Co.—**Richard W. Banfield** was recently elected a vice-president, and continues as treasurer. **David R. Anderson** was elected controller.

Illinois Tool Works, Shakeproof Div. — **Andrew L. Pontius** is now works manager.

Le Roi Co. — **Wesley A. Schaefer** will be manager of the new industrial and plant engineering department. **Walter V. Sovitzky** has been named chief industrial engineer. **Richard H. Koehler** is now manager of the advertising and sales promotion department.

Clark Equipment Co.—**A. O. Williams** will direct engineering in the industrial truck division.

B. F. Goodrich Co.—**John H. Seaton** has been named superintendent. aircraft wheel and brake manufacturing.



Illinois Tool Works —E. E. Valy has been appointed distribution manager for Illinite standard cutting tools.

Firestone Tire & Rubber Co.—The promotion of **Gordon V. Mead** to general merchandising manager has been announced.

(*Turn to page* 198, *please*)

Necrology

William H. Leary, 84, retired general superintendent of the Baldwin Locomotive Works, now part of Baldwin-Lima-Hamilton Corp., died at his home in suburban Philadelphia, Pa., Nov. 3.

Joseph G. Swain, consulting manager of the rim division of Goodyear Tire & Rubber Co., died Oct. 24 at Akron, O.

Clarence H. Booth, 76, financier. publisher, and general manager of Studebaker Corp. about 40 years ago, died Oct. 26 at Detroit, Mich.

Charles A. Brizzolara, works manager at Danly Machine Specialties, Inc., died as his home in River Forest, Ill., on Oct. 23. He was 62.

Joseph Minarik, 62, president of the Abart Gear & Machine Co., died at Chicago, Ill., on Oct. 24.

Cork particles add high compressibility to new fiber gasketing

Accopac®, Armstrong's new gasket material, has many features unusual in a cellulose fiber sheet material.

An important example is the addition of finely ground cork particles. They give Accopac high, uniform compressibility as shown by the graphs at right. This compressibility makes Accopac equally effective on light or heavy flanges.

With a stamped metal flange, for example, Accopac conforms to normal irregularities without distorting the flange between bolts. With a heavy casting, Accopac fills ordinary surface imperfections to produce a tight, dependable seal.

Won't shrink, won't grow. Accopac has unusual dimensional stability. Its saturants are non-volatile and non-extractable and cannot be leached out by fluid action. An Accopac gasket won't shrink, dry out, and leak in any recommended application.

In addition, Accopac suffers no permanent or progressive dimensional change through variations in humidity. Even after months of storage, Accopac gaskets still fit and seal perfectly.

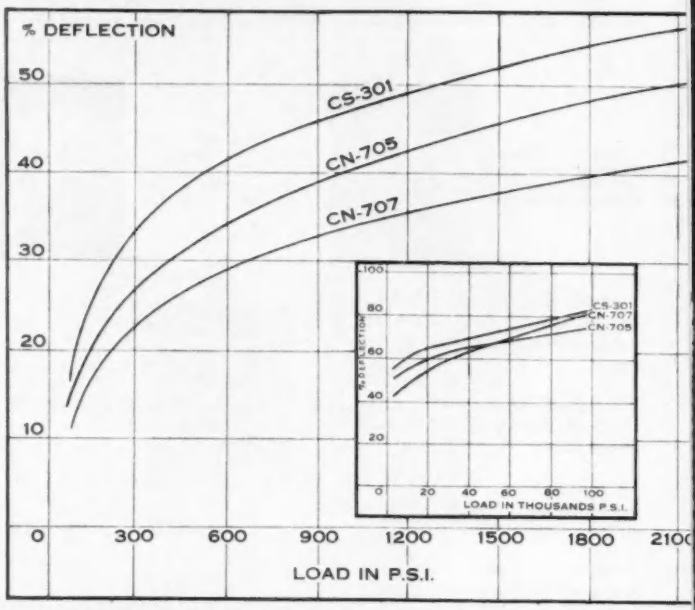
High crush resistance. Accopac's crush resistance is amazingly high. It withstands 100,000 psi without damage (conventional fiber sheets often rupture under 25,000 psi).

Crushing is often possible under the extreme high pressures found at local high spots along a flange. Accopac gives you unequaled protection against leaks caused by crushing.

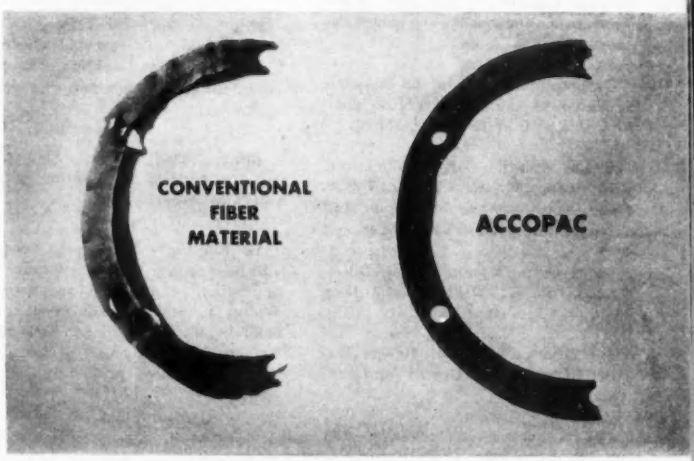
Fibers locked in rubber. Accopac is made by a new beater saturation technique. Each fiber and cork particle is completely and evenly covered with rubber saturant—literally "locked in rubber." This new process makes Accopac unusually impervious and allows much larger amounts of rubber to be deposited than is possible with other known saturation methods.

Accopac is available in sheets, rolls, ribbons, or die-cut shapes.

Write today for samples. If you cut or use gaskets, make your own tests with Accopac. For samples, call your Armstrong representative or write to Armstrong Cork Co., Gaskets and Packings Department, 5811 Arch Street, Lancaster, Penna.



LOAD-COMPRESSION CURVES. Main graph shows that Accopac compresses under very light pressures. Inset reveals that Accopac retains its compressibility without rupture up to 100,000 psi. Together, these smooth, unbroken curves prove Accopac will seal equally well on light and heavy flanges.

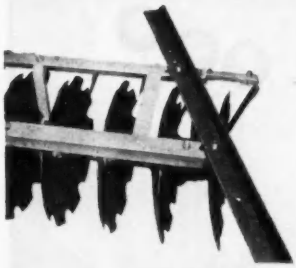


NEVER DRIES OUT. These two fiber sheet gaskets were used for 6 months in a gear pump circulating hot hydraulic oil. The conventional gasket lost its glycerine plasticizer, dried out, shrank, hardened—and leaked badly. The Accopac gasket remained virtually unaffected as shown in the above photo.

ARMSTRONG'S ACCOPAC

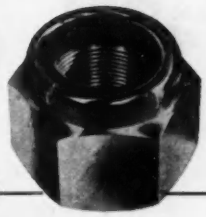
VERSATILE NEW RODERICK LEAN MOBIL-DISC HARROW





Unusually flexible, rigid frames are fastened securely with Elastic Stop Nuts

Equipped throughout with vibration-proof, self-locking Elastic Stop nuts



A new, and completely re-designed wheel type disc harrow—the revolutionary Mobil-Disc, manufactured by Farm Tools, Inc., Mansfield, Ohio—owes many of its fundamental advantages to the positive, shock-proof locking of Elastic Stop Nuts.

Mobil-Disc frames are flexible enough to perform over the roughest contours, yet tough enough to insure uniform soil penetration. It is called the most shock-absorbent frame ever built—the result of a new design approach which eliminated the older welded construction. Field studies of welded joint construction revealed that fatigue frequently resulted in joint fractures; in other cases frames were permanently "set" or bent by service operating conditions. The new method of construction specifies alloy steel section members, bolted together for greater frame elasticity and strength. Grueling field tests proved that Elastic Stop Nuts provided the only bolting method that would withstand the work-load Mobil-Disc was engineered to take!

The 200-odd Elastic Stop Nuts on each Mobil-Disc perform a double function that no other type of fastener can duplicate. They must *stay on*, under the most extreme punishment. In addition, for the Mobil-Disc to perform properly, they must *hold together* the various functioning parts without any "give". This is basic in the design of the new machine—the flexible recovery of the frame depends upon complete tightness between bolted sections—and thorough tests have proven Elastic Stop Nuts' dependability.

POINTERS on how to get best results from Elastic Stop Nuts, with an explanation of how the famous Red Collar works, are yours for the asking. Just mail our coupon.

Elastic Stop Nut Corporation of America is also maker of the ROLLPIN

Dept. N16-115, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, N. J.

Please send the following free information:

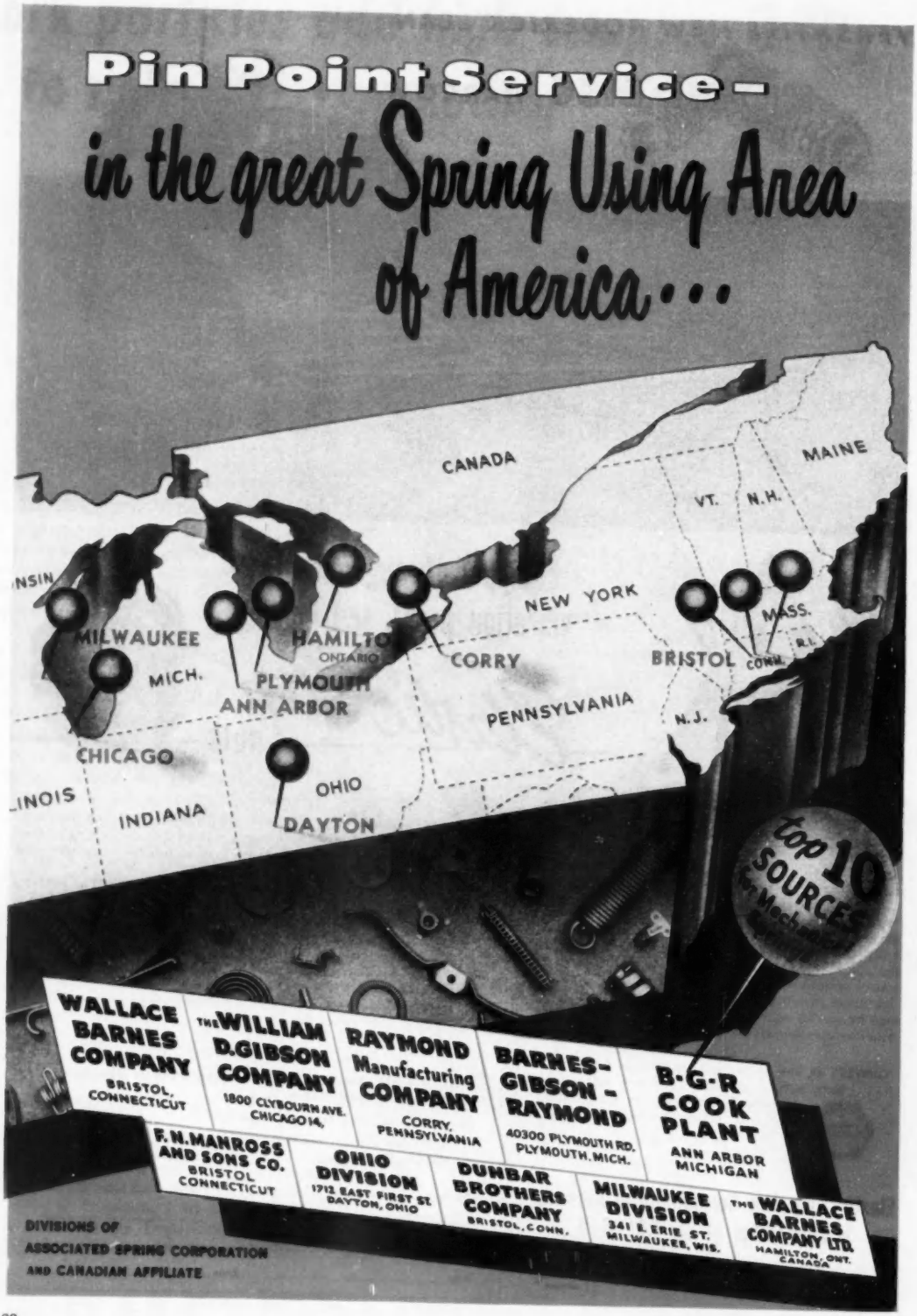
- ☐ Hints on use of Elastic Stop Nuts
- ☐ Elastic Stop Nut Bulletin
- ☐ AN-ESNA Cesversies Chart
- ☐ Rollpin Bulletin

Name _____ Title _____

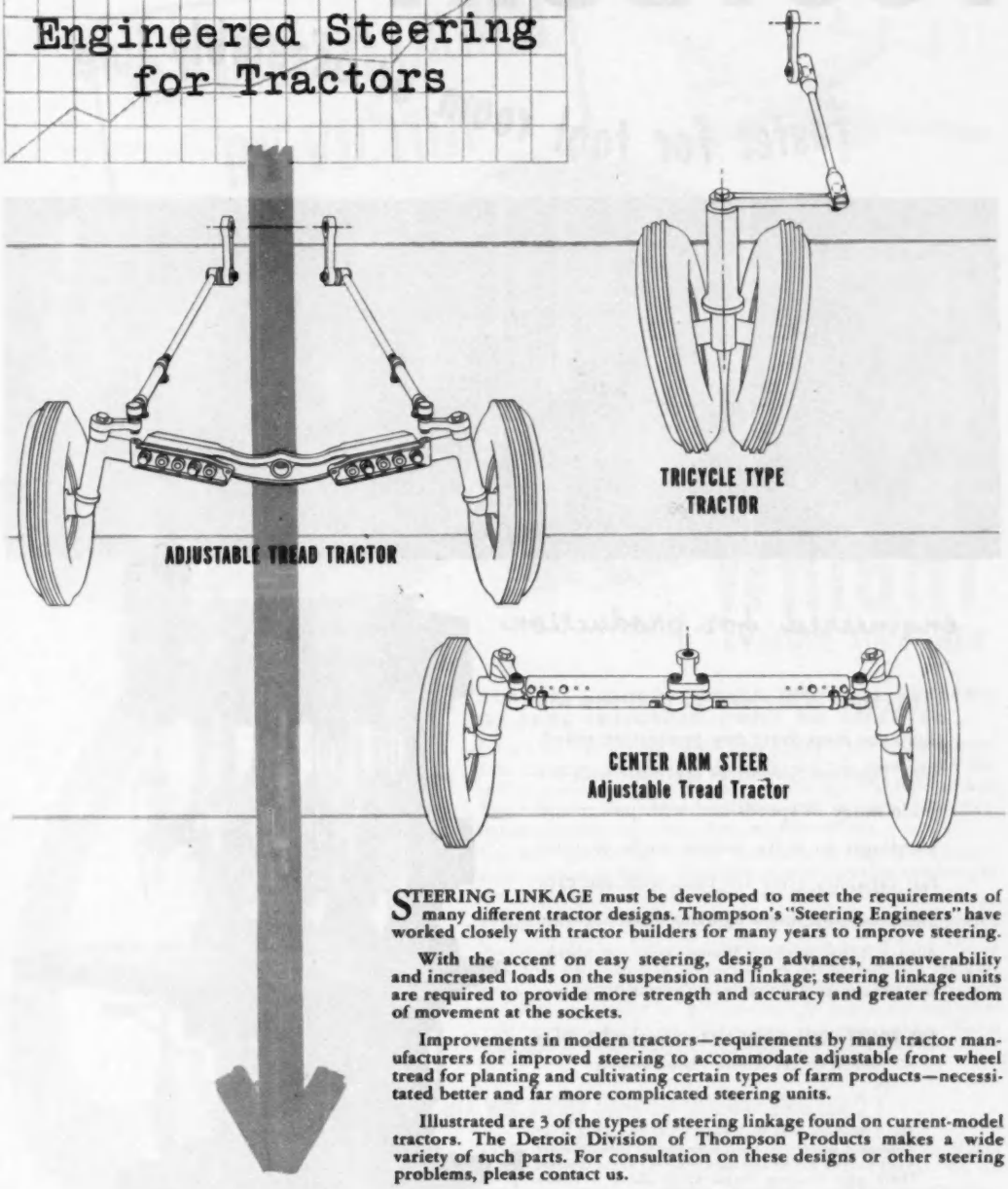
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Engineered Steering for Tractors



STEERING LINKAGE must be developed to meet the requirements of many different tractor designs. Thompson's "Steering Engineers" have worked closely with tractor builders for many years to improve steering.

With the accent on easy steering, design advances, maneuverability and increased loads on the suspension and linkage; steering linkage units are required to provide more strength and accuracy and greater freedom of movement at the sockets.

Improvements in modern tractors—requirements by many tractor manufacturers for improved steering to accommodate adjustable front wheel tread for planting and cultivating certain types of farm products—necessitated better and far more complicated steering units.

Illustrated are 3 of the types of steering linkage found on current-model tractors. The Detroit Division of Thompson Products makes a wide variety of such parts. For consultation on these designs or other steering problems, please contact us.

YOU CAN COUNT ON...

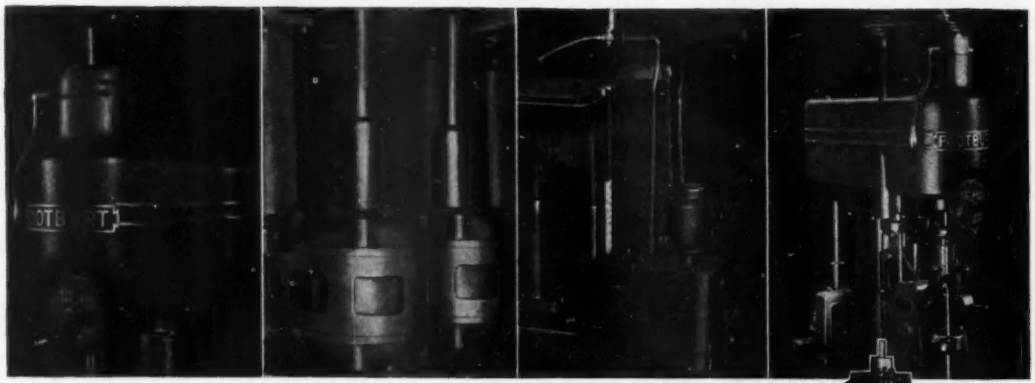
Thompson Products, Inc.

DETROIT DIVISION

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FOOTBURT

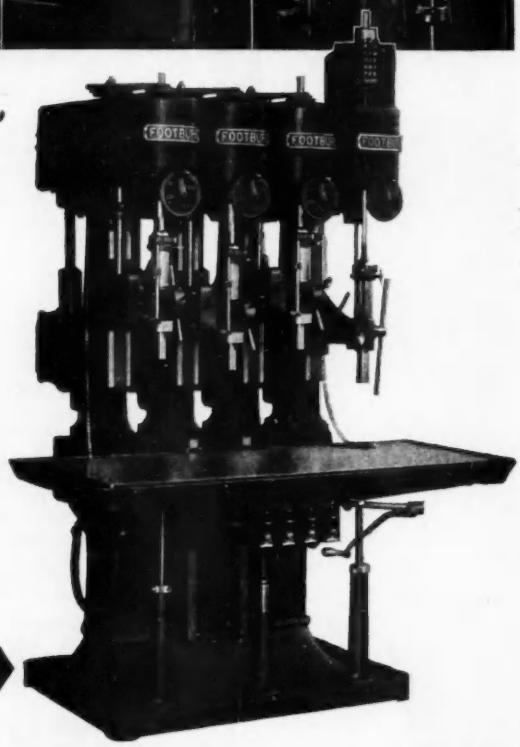
faster for tool room or assembly line



engineered for production

The choice of fine machine tools now will help you meet those new production schedules. Footburt Sensatives are built with the wide range of speeds and with power and sturdiness to drive cutting tools to their full capacity. They are built with the care and precision that will keep them accurate over a long period. Write, wire or phone for prices and delivery information.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio
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No. 2 Machine with Back Gear • 12" Overhang • ⅜" Drilling Capacity in Steel • Optional Speed Ranges • 185 to 2300 RPM • 280 to 3450 RPM • Vertical Motor Drive with Standard Single Speed Motor • Power Feed Assembly • Tapping Attachment • Coolant Outfit.

FOOTBURT

machine tools

SEALED TO ORDER BY VICTOR





WRIGHT
CYCLONE AIR POWER

QUALITY DESIGNED
QUALITY MADE
TO SEAL THE BEST

Core of this flat-type, flush-fitting laminated gasket is copper, machined to closest tolerances on all dimensions and openings. Sealing element which is chemically bonded to both faces is VICTOPAC—a Victor-developed, highly compressed rubber-asbestos sheet packing made of select long fiber asbestos and special heat-resisting synthetic rubber.

RESULT: TIGHTER, MORE DURABLE SEALING OF FUEL INJECTION PUMP TO ADAPTER

Here's an instance of how Victor Gaskets are meeting aviation service demands. Specifications in this case called for sealing gasoline under pressure with a thin flat-type gasket. Required were high compressibility and strength, with maximum resistance to erosion and gasoline effects.

For this application, Wright Aeronautical engineers found a ready answer in Victor "Sealed to Order" service, resulting in the Copper-VICTOPAC laminated gasket shown at left.

COMPLETE SEALING SERVICE TO AVIATION INDUSTRIES

As the leader in sealing products research and design, Victor can give you valuable assistance on all automotive applications using gaskets, shaft seals, or packings. Manufacturing facilities are largest in the industry. If you don't find what you need in the broad Victor line, the experienced Victor engineer in your territory will help you get it.

Where can we help you to better sealing?

Victor Manufacturing & Gasket Co., *and its affiliate*, Victor Sealing Products Co., Inc., P. O. Box 1333, Chicago 90, Ill.

VICTOR GASKETS AND OIL SEALS

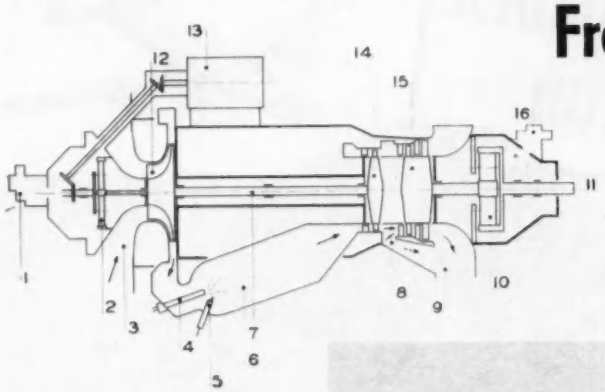
VICTOR

"ORIGINAL EQUIPMENT"

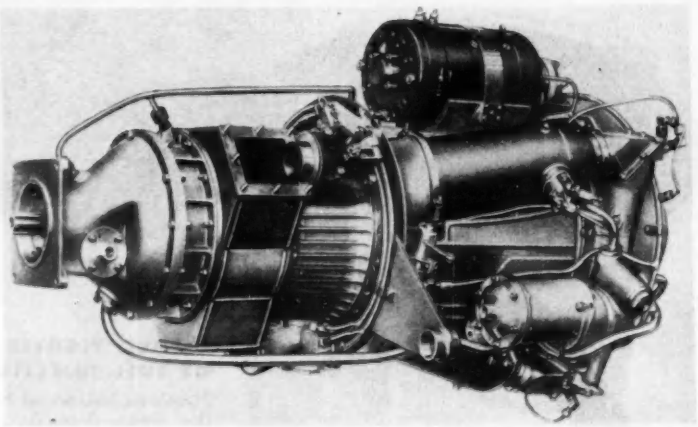
Gaskets and Oil Seals

SEALING PRODUCTS EXCLUSIVELY

French Gas Turbine Tested in



Schematic longitudinal sectional view of the gas turbine. 1—High pressure turbine regulator. 2—Reduction gear for auxiliaries. 3—Air inlet. 4—Fuel injector. 5—Igniter plug. 6—Compressor-turbine shaft. 7—Combustion chamber. 8—Exhaust by-pass. 9—Exhaust passage. 10—Reduction gear. 11—Output shaft. 12—Compressor wheel. 13—Generator-starting motor. 14—High pressure turbine. 15—Low pressure turbine. 16—Governor for low pressure turbine.



The SOCEMA 100-hp gas turbine.

By W. F. Bradley
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

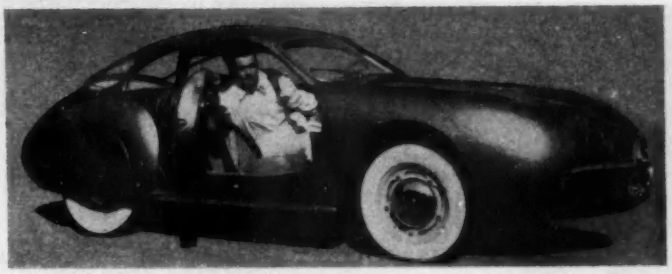
PARIS, FRANCE

DEVELOPMENT work is now under way in France by SOCEMA (Societe de Constructions et d'Equipment Mechaniques pour l'Aviation) on a gas turbine for trucks and buses. Experiments are being made with the turbine in a special stream-lined, two-passenger coupe designed by J. A. Gregoire, although there is no intention of producing a car similar to the one used for testing the new power plant. The automobile was first powered by a conventional engine for road tests, before installation of the gas turbine. When all experiments have been successfully completed, the turbine will be installed in a truck or bus.

In general, the chassis is similar to those produced by Gregoire for the Hotchkiss Co. All four wheels are independently sprung, and the rear axle, attached to the integral body and frame, is of the De Dion type. Just ahead of it there is a unit comprising clutch, Cotal electro-magnetic transmission, and electro-magnetic brake. At the front, and almost entirely ahead of the steering wheels, is the gas turbine. The power plant and transmission are connected by an open drive shaft, making it possible to test out each unit separately, without either one influencing the other. Head lamps are concealed. There is a circular opening in the grille to admit air to the turbine. Wheelbase is 90½ in., tread 53 in., and weight with turbine 2800 lb.

The "Cematurbo" gas turbine, built by SOCEMA, is of the three-combustion chamber type with the accessories built around it, and has a centrifugal compressor driven by a single-stage, high-pressure turbine. After passing through the high pressure turbine, the gases are fed to the two-stage, low-pressure turbine, where they furnish the power through reduction gears. The two turbines are mechanically independent, the speed of the compressor turbine being 42,500 rpm, while that of the power turbine is 25,000 rpm. The planetary reduction gear reduces the shaft speed to 5000 rpm, and the rear axle ratio is 10-32. By using a slightly smaller than usual compressor, output has been held down to about 100 hp. No heat exchanger has yet been fitted, but it is claimed that one of very

Sports Car



Special coupe in which the gas turbine is undergoing tests.

small volume has been provided for in the design and that it will be fitted in the next stage of development.

The compressor-turbine shaft is of small diameter and carried in four ball bearings. The turbine wheel is formed of two disks bolted to the plate forming a part of the shaft. These disks hold the rotor blades, which have fir-tree roots. The 32 stator blades and the 68 rotor blades are solid and are of heat-resisting alloy. Cooling of the high pressure turbine is provided by tapping the main air supply from the compressor and leading air to the forward face of the turbine wheel. This also forms an air seal, preventing escape of gases from the chamber surrounding the two turbines.

The low pressure or power turbine is of the same general construction but does not carry any special cooling device. With the idea of adding a heat exchanger at a later date, there are three separate exhausts from the power turbine. A release valve is installed between the high pressure and the low pressure turbines to by-pass the gases coming from the high-pressure turbine when the vehicle is standing and the compressor is running.

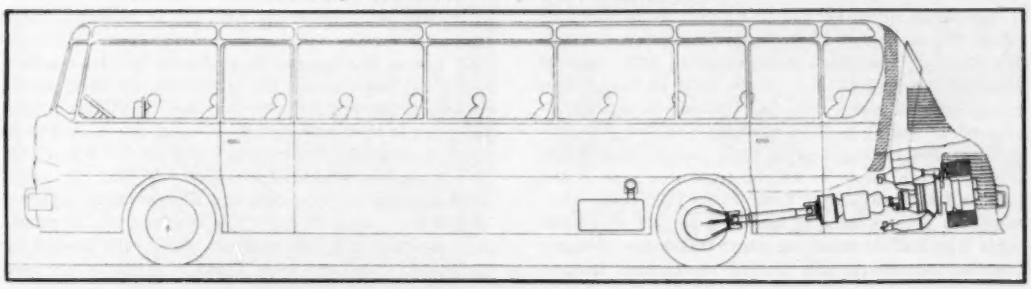
The speed of the turbine is controlled by a pressure regulator acting on the fuel line, and corresponding to the position of the accelerator pedal. In addition, there is a governor composed of a small centrifugal pump fed with fuel oil and operating on a piston balanced by a spring. When the pressure becomes too high the piston is raised, causing a drop in pressure on the fuel line.

The auxiliaries are driven by a small planetary reduction gear, with a ratio of 12 to 5, placed at the front of the turbine, on the secondary shaft of which are bevel gears with drives for the generator-starting motor, the fuel pump, and the three oil pumps. One of these oil pumps delivers oil under pressure to the bearings and the two others are scavengers. The fuel pump is a piston type, capable of giving pressures up to 995 psi.

Starting is exactly the same as that of a piston-type engine, the generator-starting motor being a standard Paris-Rhone, as used on passenger car engines. There is an accelerator pedal and a brake pedal. At present a single plate Ferodo clutch is fitted, together with a Cotal electro-magnetic, four-speed transmission. This, however, has been done to facilitate development work on the chassis. The clutch will not be required with the turbine and the number of gears can be reduced to two, but these will necessarily be of the constant mesh type. A Telma electric 12-volt brake is mounted behind the transmission. This is a standard type as used extensively on European trucks.

Fuel consumption is 99.2 lb per hp hr, but with a heat exchanger it is calculated that this will be reduced 20 per cent. Weight of the turbine is 264 lb, including equipment necessary for experimental purposes. It is said that the production model can be reduced to less than 200 lb.

Proposed installation of the gas turbine in a bus chassis.





Overall view of lower back panel stamping line No. 15 showing four Danly underdrive presses. The 1000 ton press in the foreground has a bed area 132 by 84. Parts are automatically conveyed from press to press.

Greater Emphasis *in Stamping*

Ford Makes Use of Transfer Conveyors, Iron Hands and Other Unique Mechanical Handling Devices for Loading and Unloading Presses at New Buffalo Plant

AUTOMATION—for relieving operator fatigue, insuring uniformity and accuracy in feeding and extracting parts during the manufacturing process, and the utmost in personnel safety—are the major factors that have been stressed in engineering the latest Ford Motor Co. stamping plant, located in Buffalo, N. Y.

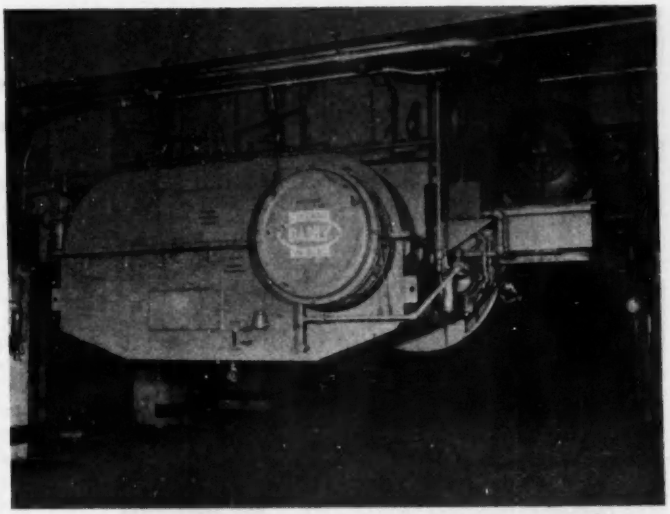
This modern plant has a production capacity of about 42 per cent of all the metal stampings required for Ford automobiles. Approximately 1800 tons of steel per day will be used by the plant at the current maximum production rate, but this can be readily increased, according to Ford officials.

There are 19 major press lines and a total of 291 presses which range in weight from five tons to 450 tons and have capacities from 75 to 1200 tons. Dies for these presses vary in weight from 200 lb to 200 tons. The Buffalo stamping plant makes use of many transfer conveyors and unique mechanical devices which load and unload the large presses to carry out Ford's automation method of automatically handling materials during the manufacturing process. Another interesting feature of the plant is the manner in which the presses have been installed. They are supported by steel grill work over a 17-ft deep basement area. This unique sub-floor level provides ready access to any part of the press for servicing. Trimmings are chuted here from die area through opening in floor above, thus keeping the production floor clean.

Because of the many press lines and the vast number of presses in the Buffalo stamping plant, this article will deal mainly with eight typical press lines where the Ford automation principle is employed.

On line No. 2 where the cowl top is produced, there are seven presses ranging in capacity from 75 tons to 685 tons on the inner slide of one of the triple action units. At the start of the operation, the sheet metal is automatically lubricated by the De Vilbiss equipment. It is then automatically loaded into a Hamilton triple action press which has a bed size of 108 in. by 64 in., an inner slide capacity of 685 tons, an outer slide capacity of 485 tons, and a lower slide capacity of 385 tons. After the cowl top is drawn in this press, it is automatically extracted by iron hands located on each side of the press bed. These hands move the part

By
Thomas
Mac New



View of Danly underdrive press from sub-floor level. Many routine maintenance operations are performed on the press at this basement area.

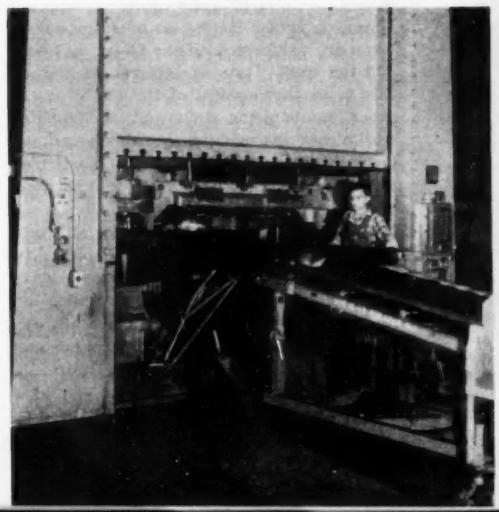
on AUTOMATION

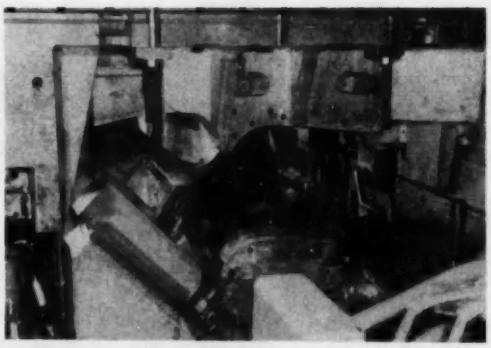
Production

to an automatic turnover device where it is transferred to an automatic conveyor for entrance into a Danly 600-ton capacity press. This Danly press, which has a bed size of 96 in. by 72 in., restrikes the work. The part is then taken on an automatic transfer unit to a Hamilton single action press. Having a capacity of 500 tons and a bed size of 96 in. by 60 in., this press trims excess sheet metal from the cowl top. The cowl top is then automatically extracted, placed on a transfer unit which takes it to a similar Hamilton press where the top is flanged. A steel slide rail is used to transfer the work from the Hamilton press to a 130-ton Niagara unit where it is pierced. For the final two operations, where the work is restruck, two 75-ton Niagara units are employed.

The first drawing operation on line No. 4 is performed by a Hamilton triple action press. This press, which is automatically loaded, has an inner slide, outer slide, and lower slide capacity of 685 tons, 485 tons, and 385 tons respectively. Bed size is 108 in. by 72 in. After the original drawing operation on the

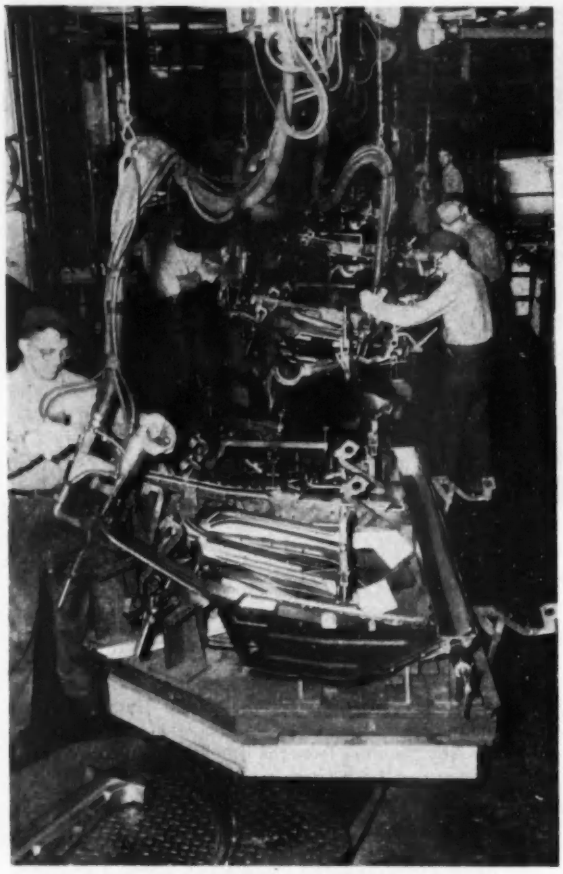
Danly underdrive press at station 2 in rear floor pan line No. 16. The feeding conveyor shown, as well as the press, is operator controlled.





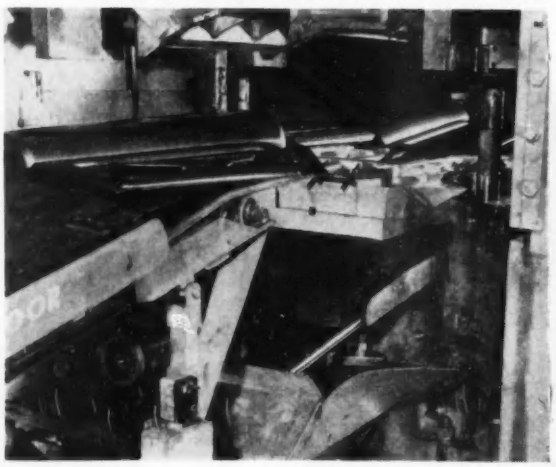
Looking into trimming and piercing dies with side cam action mounted in a Danly underdrive press at station 2 in line No. 10, producing outer luggage compartment doors. Note rubber rollers set right into die to prevent damage as the piece is ejected.

Continued . . .



This view shows one of the two merry-go-round type conveyor lines used for welding various body components manufactured at the Ford Buffalo Stamping Plant.

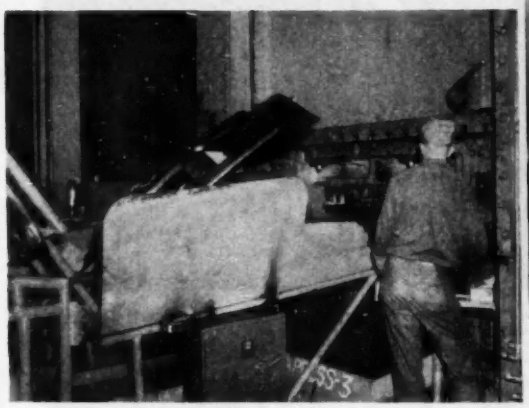
Close-up view of second operation, trim and pierce, outer door panel line No. 4. Pieces are conveyed from the drawing operation and hand fed to the dies. Trimmings are chuted from die area through opening in production floor to sub-level.



door outer panel, which is produced on this line, a side-operated automatic extractor is used to transfer the work to an automatic turnover device. This turnover device is equipped with rubber disks to prevent marring the outer surface of the door panel. The turnover device flips the work onto a 40-in. wide belt conveyor which takes it to a 600-ton capacity single action Danly unit for trimming operations. An overhead iron hand is used to remove the workpiece and place it on a transfer unit where it is taken to a 450-ton single action Hamilton. This unit, which has an 84-in. by 60-in. bed, is used for flanging. When the work is removed from the Hamilton press, it is carried on a steel slide rail to the next press where it is cam pierced. It is once again carried by a steel slide rail to the succeeding press where cam expanding operations are carried out. In both of the previous operations, 500-ton Clearing presses with bed size of 85 in. by 72 in. are utilized. For the final operations of cam piercing, a 100-ton Niagara is brought to play.

There are four press operations involved in the production of the outer center body pillar on line No. 8. Sheet metal is automatically loaded into a triple action Hamilton press for drawing. This press is similar in capacity and bed size as the unit that heads line No. 2. The body pillar is transferred from the drawing operation on a slat type conveyor to a 600-ton Danly, having a bed size of 96 in. by 72 in., for restrike. A steel slide chute then is used to convey the material to a Hamilton press for trimming. This 84-in. by 60-in. bed size press has a capacity of 450 tons. Once again, the workpiece is transferred by means of a steel slide chute to another Hamilton press. Here, cam finishing operations are performed on the 96-in. by 60-in. 500 ton unit. It is of interest to note at this point that several of the conveyors or other mechanisms employed to transfer workpieces are mounted on wheels and can be readily adapted to suit any particular production transfer problem between presses.

Sheet metal is loaded automatically into a Hamilton triple action press, similar to the one heading line No. 4, for drawing the inner luggage compartment door panel on line No. 9. The panel is automatically extracted from the triple action press and placed on an automatic transfer unit. By





Between the first and second operation on line 9, this chain driven automatic transfer mechanism is used.

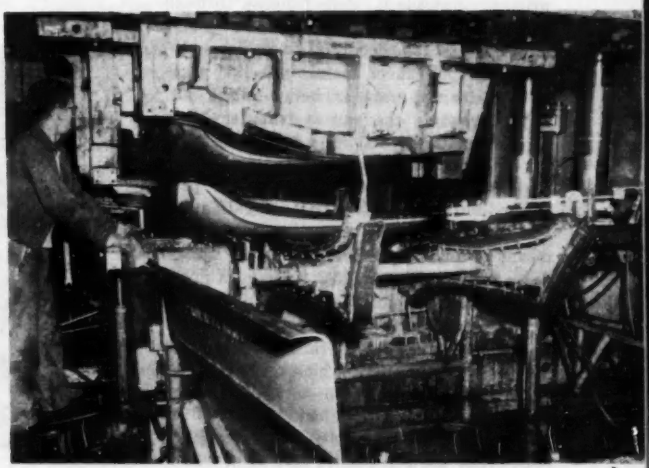
An automatic turnover mechanism on line No. 9 is used in conjunction with an automatic extractor and loading device.

means of this mechanism, it is automatically loaded into a 500-ton Clearing press for restrike; this press has a bed size of 84 in. by 72 in. A side-opeated extraction device is used to remove the work from the restrike operation onto a turnover mechanism and then onto an automatic loader for trimming operations in a 600-ton Danly. The turnover unit in this instance consists of steel tubing made in the form of a huge fork, as illustrated. For carrying the work from the trimming operation to the last press on the line which is used for piercing, a steel slide rail is utilized. For this final operation, a 450-ton Hamilton unit has been installed.

Only three press operations are necessary for the production of the outer luggage compartment door panel on press line 10. Here, an automatic loader carries the work to a triple action Hamilton for drawing. This press, which is similar to the one on line 9 and line 4, has a bed size of 108 in. by 72 in. and an inner slide, outer slide, and lower slide capacity of 685 tons, 485 tons, and 385 tons respectively. A side-operated unit automatically removes the work after it is drawn, and places it on an automatic turnover device which in turn places the panel onto an automatic transfer unit for insertion in a Clearing press. After trimming in the 500-ton capacity Clearing, the workpiece is conveyed by means of a steel slide chute to a 600-ton, 96 in. by 72 in. bed size Danly for flanging.

Farther along line 10 where the inner and outer luggage compartment door panels are assembled, there is another interesting example of the Ford automation principle in practice. Here, after the inner and outer door panels have been placed together, a conveyor fitted with rubber disks transports the parts to a Clearing press. Since the press bed height in this case is roughly 1½ ft above the conveyor, Ford has devised an automatic lift along with the conveyor which raises the workpiece so that the operator may easily inject it into the press.

Eight presses are employed for operations on the body rocker panel on line No. 12. For drawing, sheet metal is automatically loaded into a 108-in. by 64-in., 1200-ton Clearing press. Body rocker panels are automatically ejected from the drawing operation onto a



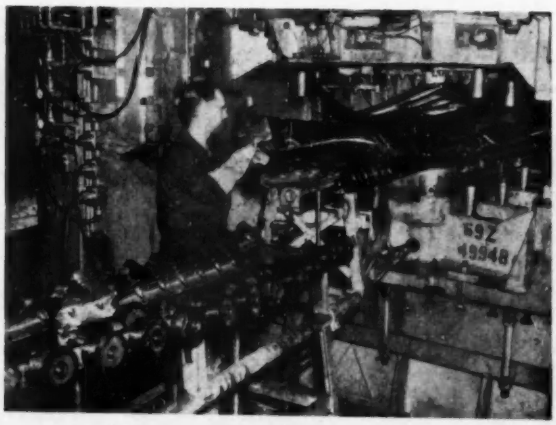
For turning the workpiece (a roof panel), a rubber padded, trunnion mounted turnover is used after the drawing operation on line No. 18.

unique device for turning the part 180 deg. This turnover mechanism is in the form of a plunger which rams against the workpiece, upon tripping a switch, and places it on a slide type conveyor. As the work travels a short distance over the conveyor, it comes into contact with a fixed fence which places it in more or less the same longitudinal plane as the direction of the conveyor. Next, the rocker panel is placed in a 500-ton single action Hamilton for trimming. Here, the part is cut into two sections, which are discharged on each side of the press onto separate conveyors which run along two Niagara and two Hamilton units. Operations along both conveyors are exactly the same. After the original trimming, the work is trimmed and notched in a 75-ton Niagara. It is then returned to the belt conveyor for a forming operation in a 500-ton Hamilton. Again being returned to the conveyor, it is inserted into another 500-ton Hamilton for flanging. For the final operation, piercing, a 75-ton Niagara press is employed.

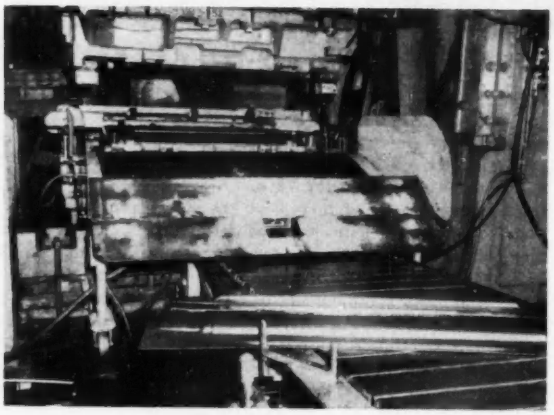
Coming along to line No. 16 where the rear floor pan is manufactured, there is another triple action Hamilton press used for the drawing operation. In this case, the press has inner and outer slide capacities of 800 tons each, and a lower slide capacity of 540 tons, with a press bed size of 135 in. by 84 in. The press is automatically loaded by means of the same mechanism that automatically unloads it. Rods running through the press from the automatic extractor have fingers attached to them which automatically pull sheet metal into the press as the formed part is being taken out. After drawing, the pan is transferred to an 800-ton Danly, having a bed size of 120 in. by 84 in., on a belt conveyor. Following trimming operations, which are performed in the Danly, the part is again automatically unloaded and transferred by means of a belt conveyor to a similar Danly press for flanging. A 75-ton Niagara press is used for the final operation of piercing.

The roof panel which is produced on line 18 is formed in three operations. The first operation on this part, which must be deep drawn, is performed in a triple action Hamilton press having a bed size of 180 in. by 100 in. The capacity of the lower slide is 540 tons while the inner and outer slides have a capacity of 800 tons each. After

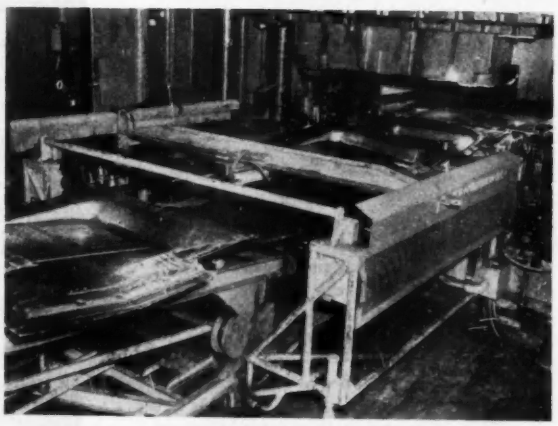
(*Turn to page* 105, *please*)



A portion of the conveyor carrying the inner and outer luggage compartment door panels to a Clearing press on line No. 10 for clinching, automatically elevates the assembly to press bed height.



At the rear of the Drawing press on line No. 12, a plunger or ram type turnover is used. Note the fence which aligns the part for the next operation.

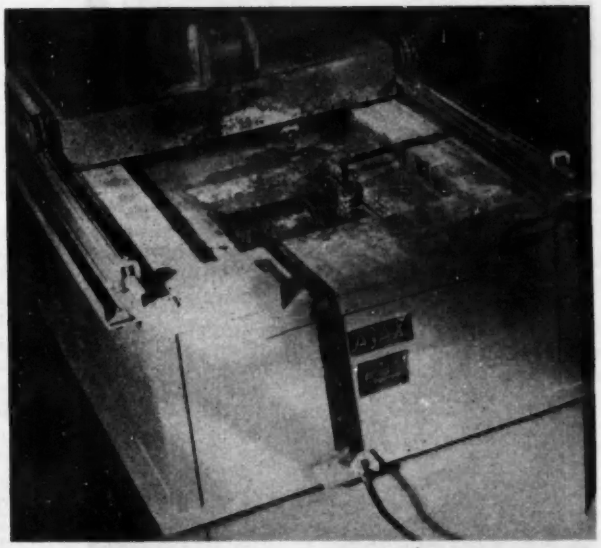


At the rear of the first press in No. 16 line, a recoil type iron hand for unloading the press has rods going through the press (a Hamilton) which feed sheet metal as the drawn part is removed.

Coating Metals with Aluminum

by the Mollerizing Process

By Bruce E. Haight
Technical Assistant to the President,
American Mollerizing Corp.



A 50-kw electric furnace arranged for demonstrating the Mollerizing process.

ALTHOUGH the value of an aluminum coat for protection of fabricated iron and steel parts against heat and corrosion was demonstrated many years ago, practical commercial processes for hot dipping have come into use only within the past few years.

One successful method of hot dipping ferrous parts in molten aluminum is in use by the American Mollerizing Corp., Beverly Hills, Calif. In this process, known as mollerizing, molten aluminum is floated on a molten salt flux in a ceramic-lined, submerged electrode salt bath furnace.

The heating medium is blended of barium chloride, and sodium chloride to give a specific gravity greater than that of molten aluminum. To make the molten salt a "flux" capable of dissolving iron and aluminum oxides, cryolite is added. The vapors of cryolite escape around the edges of the aluminum layer and form a protective layer of gas over the aluminum, thus minimizing formation of aluminum oxide which adversely affects the fluidity of the molten aluminum.

Fabricated parts to be mollerized are first subjected to preliminary cleaning. The material must be thoroughly dry and free of any oxide layers before immersion in the furnace. The surface condition of the steel prior to immersion largely determines the quality of the aluminum coat.

When dry, the work is lowered into the furnace through the aluminum layer. The work remains in contact with the salt until it has reached coating temperature and until the fluxing action of the salt has removed any adhering oxides, and is then withdrawn through the aluminum layer upon which is superimposed a direct electrical current creating an affinity between the otherwise electrically incompatible metals.

The aluminum layer may be varied in thickness to suit operating schedules and size of work. Since iron dissolving from the work gradually contaminates the bath, the aluminum must be either sweetened or replaced periodically.

For conveyorized or continuous coating of strip, sheet, and wire, a "split" furnace is used where the molten aluminum is either confined to the exit end of the furnace by a ceramic barrier that extends down into the furnace only far enough to confine the layer of floating aluminum, or it may cover the entire surface of the salt bath. The conveyor or continuous strip enters the salt at one end of the bath and leaves through the aluminum at the opposite end.

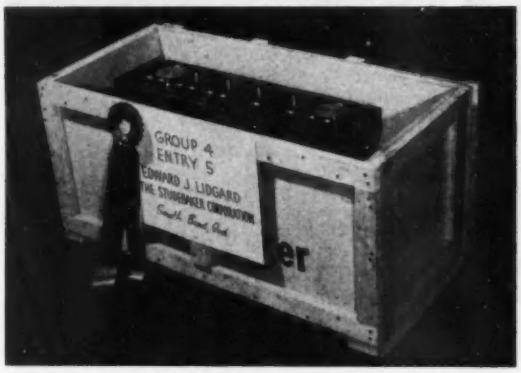
Thickness of the coating is controlled by varying the final speed of withdrawal and the temperature of the metal. Surplus aluminum on the bottom of the work is removed by centrifuging, vibrating, or by jets of air. A final hot water wash removes any salt that may remain on the work. Treatments of aluminum to improve resistance to corrosion (anodizing and chromate oxidation) can be applied to mollerized steel.

The mollerized coat consists of two distinct layers. The bonding layer of iron-aluminum alloys forms very rapidly when heated steel is brought into contact with molten aluminum. Upon final withdrawal from the coating bath a cast layer of aluminum is deposited over the bonding layer. The alloy layer has excellent

(*Turn to page* 96, *please*)



GMC Truck & Coach Div. won second prize for this sealed beam headlight package in the export packaging competition.



For this cleated panel box, containing a stripped engine assembly, Studebaker Corp. won a first prize. A corrosion preventative is used in the package.

In the competition for wirebound boxes and crates, the Ford Motor Co. took first prize. A 786 lb engine is contained in a 100 lb wirebound crate for shipment.



Automotive and

AUTOMOTIVE and aviation companies took the packaging and materials handling spotlight at the well attended Seventh Annual Industrial Packaging and Materials Handling Exposition held last month in Chicago. Out of a possible 21 prizes in packaging competition, companies engaged in the manufacture of automotive and aviation products took 11 places. Engineers presented technical papers on many phases of materials handling.

In the competition dealing with the use of corrugated or solid fibre boxes for packing, the second prize went to Ternstedt Div., General Motors. This prize-winning package, containing an automobile hardware part, provided a wall on each side of the material being packed and offered greater compactness than a former package, saving up to 41 per cent in cubic displacement. A saving of 61 per cent was realized in the packaging material cost. By the use of the new package, labor efficiency was said to have increased by 86 per cent in packing the various parts.

Ford Motor Co., Engine and Foundry Div., took first prize in the competition for wirebound boxes and crates. An engine assembly, weighing on the order of 786 lb, was packaged in a wirebound container that weighed approximately 100 lb. Particular advantages claimed for this package are the reduction in tare weight, labor saving in packing and unpacking, rigidity and strength, and ease in handling. All of these together provided a 35 per cent saving over the previous package. The new container was impact tested in two directions, and a compresion test was made by placing 1500 lb on top of the container. Another interesting fact is that this container can be re-used to return engines needing factory overhauling. Tare weight of the container was reduced 90 lb from the original wood crate construction.

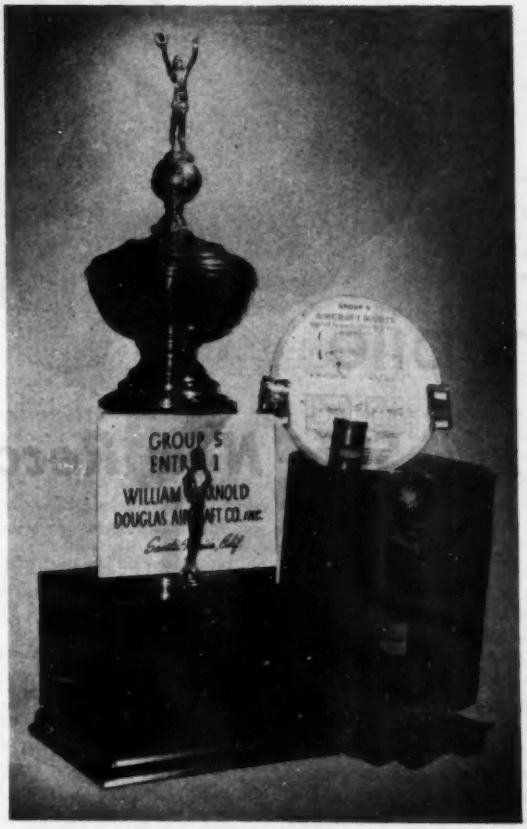
A first prize was claimed by the Studebaker Corp. for its cleated panel box containing a stripped engine assembly. In this case, the engine assembly, which weighs 225 lb, is contained in a package weighing only 30 lb. The problem encountered by Studebaker in engineering this

Aviation Packaging Wins Awards

New Developments Featured at Seventh Annual Industrial Packaging and Materials Handling Exposition in Chicago

package was to supply an engine assembly without an oil pan that would require no cleaning prior to installation. This package also utilizes a corrosion inhibitor, making the pack suitable for one year's storage. Savings made by utilizing this box were for freight and material handling costs.

The Harold Jackson award for the package incorporating the most effective feature developed in the past year for the prevention of theft and pilferage in overseas shipment went to the Douglas Aircraft Co. This package which contains aircraft chronometers also won the second prize in general competition. The package itself had an exterior fibre drum using Kimpak for cushioning, an intermediate metal container, and a metal can. This metal can was sealed by means of blind rivets to prevent pilferage, and taped to prevent moisture from entering the can at the seams. The can contained an intermediate cushioning together with the unit packages in a metal edge chip board box. See the illustration just above.

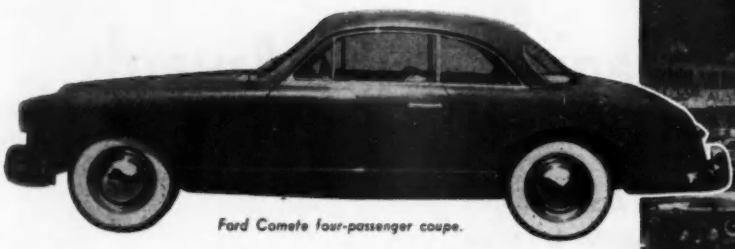


Harold Jackson award and Douglas Aircraft Co. package that won it.

Sealed beam lamp units packaged for export won a first prize for GMC Truck and Coach Div. Consisting primarily of a nailed wooden box, the package also was composed of vapor corrosion inhibitor paper, a fibre board metal-end can and a weather resistant corrugated carton. In this particular case, due to the package being constructed to overcome the breakage problem, the container weight was the same as the weight of contents. GMC tested this package 200 hr in a five per cent solution of salt spray at 95 per cent relative humidity and 95 to 100 F. It also has been tested for outside storage by being exposed to the elements for a period of three months; there was no evidence of failure. The drop test, which consists of two drops from a height of 30 in. on all six sides, did not expose any failures. Production packaging has been increased from 125 units per hour to 450 units per hour utilizing the same personnel.

Bendix Products Div. of Bendix Aviation Corp. received a second prize for its export package which contained a 24 in. aircraft brake. Here, the package

(*Turn to page 87, please*)



Ford Comete four-passenger coupe.



United Press photo.

Newest Pegaso with supercharged engine.



Paris Automobile Show . . . *Sets New Records* . . .

PARIS, FRANCE

OCCUPYING an area of 200 acres and with every phase of highway transportation represented, this year's Paris Automobile Show in October was the largest ever held. Of the 1300 exhibitors, those displaying passenger cars and equipment were housed in the Grand Palais on the Champs Elysees, while three permanent exhibition halls on the southwestern edge of the city housed commercial vehicles and cycles.

The American industry was completely represented so far as passenger cars were concerned. All the General Motors makes were present, with the addition of Vauxhall from England and Opel from Germany. Ford interests were grouped around the French company, with models from America, Germany and England. Among the nineteen American concerns, all the independents had exhibits and for the first time Cunningham appeared with an American-built chassis carrying an Italian body. A Muntz sports car from Indiana put in an appearance after the show opened.

The French industry had 15 makes of passenger cars; the English sent 22, Germany 18, and Italy six. The opening of the show was marked by varied price reductions on the part of practically all French makers and by a reduction in delivery delays. Production is increasing and for the first six months of this year was 15 per cent ahead of the corresponding period of 1951. Because the makers are tied up with big production programs, new models were rare and even modifications were mostly of a minor nature.

Renault continues on the same general lines, with two main passenger car models, the rear engine 750 and the 122 cu in. Fregate. Both these are all-steel integral body and frame types. A luxury model has been added to the Fregate line, the difference being in the more elaborate equipment. The Colorale line, which comprises mostly light commercial vehicles, has been modified by the use of the 122 cu in. engine, in place of the L-head type used on the Fregate. Considerable progress has been made in the installation of the new factory to the west of Paris, where more than one hundred Fregate models are produced daily.

Citroen is continuing the front-wheel drive job which has been on the market since 1934, the modifications being an increase of 50 per cent in the size of the luggage compartment, with the spare wheel inside;



Mercedes Model 300 sedan.

Transverse sectional view showing piston, valve, combustion chamber, etc., of the Mercedes 300S engine.

Bugatti Model 101, the only straight eight at the show.

By W. F. Bradley
Special European Correspondent for Automotive Industries

reduction of 40 to 50 per cent on clutch pedal pressure, a new instrument panel, concealed windshield wiper motor; improvements in ventilating and heating. Production of the flat-twin, air-cooled car has been stepped up and the reduced price of $855 makes it the cheapest four passenger automobile on the French market.

Peugeot, with a factory laid out for the production of one model only—the 203, with inclined valve-in-head engine—has made no other mechanical changes than details in piston design, but has added new body styles. The series of commercial vehicles make use of the passenger car mechanical units.

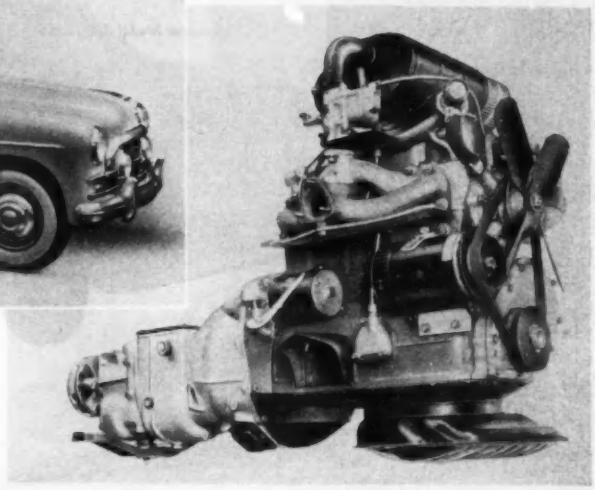
Simca's policy is somewhat similar; a single model, the Aronde of integral body and frame construction, with a valve-in-head engine of 74 cu in. piston displacement, to which has been added a sports coupe, the engine of which develops 51 hp. Panhard has just produced the 850, which is the aircooled twin with the bore increased to 3.34 in., the stroke remaining at 2.95 in., thus giving a piston displacement of 51.8 cu in., compared with 45.7 cu in. for the standard engine. General design remains unchanged, featuring two opposed aircooled cylinders, valve closing by torsion bars, a ball bearing crankshaft and connecting rods, and a very extensive use of light alloy. The 850 which develops 38 hp, or 40 hp with a dual carburetor, has a heavier crankshaft, with balance weights, light alloy pushrods, in place of steel, and an improved transmission. The Kreiss automatic transmission adopted a year ago is being developed but has not yet been put on the market. An economical taxicab having the same mechanical units as the passenger car, has been put on the market. The baggage problem has been solved by a full-width door across the rear of the cab and by a roof rack.

Ford took advantage of the show to announce a mechanical guarantee, covering both parts and labor for 30,000 miles or one year. The changes made by Ford on the V-8 Vedette include a climatized engine, with thermostatically controlled air entry, assuring constant engine temperature whatever outside conditions. The radiator is filled with distilled water and anti-freeze before leaving the factory. The new body has had its center of gravity lowered, the windshield and the rear window have been increased in size, and foam rubber upholstery is used on zig-zag seat springs. The Comete model differs in body styling and is supplied with either mechanical or Cotal electro-magnetic transmission.

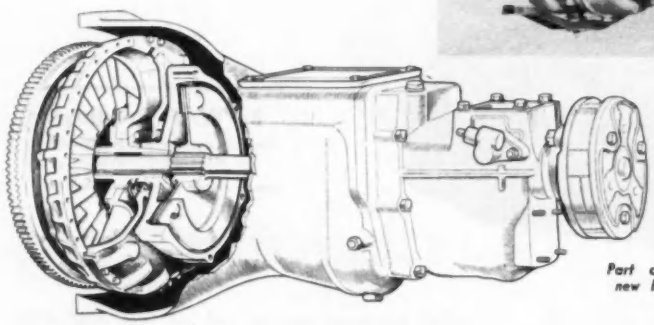
Bugatti had the only straight eight in the show, the Model 101, of 198 cu in piston displacement, with Roots type blower. The same engine is available without a supercharger. No changes have been made since last year, but new models are in preparation. French Talbot has gone to one type of chassis with three engines, a four and a six with the same piston displacement of 164 cu in., and a big six of 274 cu in. In addition, there is a competition car with the 274 cu in. engine of 196 hp on a short wheelbase chassis.



Completely new Fiat, the 1900.



Fiat 1900 engine with fluid drive and five-speed transmission.



Part cutaway view of new Fiat fluid drive.

Refinanced after voluntary liquidation, Salmson has resumed production of last year's model. Delage and Delahaye, now under the same management, have no new passenger car models. The same applies to Hotchkiss and to Rosengart.

German representation was strong in Paris this year, with Mercedes-Benz occupying a leading position. The latest Mercedes cars are the 300 and the 300S, the two being similar in design, but the latter being a sports model with the wheelbase shortened by six in. and the output of the 182 cu in. six cylinder engine stepped up to 150 hp by three downdraft carburetors, higher compression, and a special camshaft. A feature of the 300 engine is the shape of the combustion chamber formed by the step-head piston. The plane surface of the piston head is inclined and corresponds to the valve area, while the compression area is confined to the space above the step in which the spark plug is mounted. The cylinder head is of light alloy with valve seat inserts, and compression ratio is either 6.4 or 7.5 to 1. This car features an oval-section tubular frame, a hydraulic damper in the steering linkage, and electric adjustment of rear spring flexibility. Wheelbase of the 300 is 120 in., with a front tread of 52¾ in., and a rear tread of 60 in. On the sports car the front tread is increased to 58¾ in. Body styles comprise a cabriolet and a coupe. The type of door hinged along the center of the roof line, as used for the first time in the Le Mans 24-hour race, was presented at the show.

Excluding Opel and Ford, a feature of the German display was the adoption of small two-cylinder, water-cooled, two-stroke engines with either front drive or rear mounting. With the entire power plant ahead of the axle, and the radiator under the hood with air inlet on the side panel, the required space is reduced to a minimum and the problem of getting flowing body lines is simplified. This type of automobile, as produced by Champion, D.K.W., Borgward, Gutbrod and Lloyd, is offering serious competition in its price class to other European makers.

Fiat has produced an entirely new passenger car model designated the 1900, which is the piston displacement in cubic centimeters (116 cu in.). Although the general design is similar to that of the 1400 which came out a couple of years ago, apart from the increase in the engine size, there are some important changes. The 1900 is an integral body and frame construction, with the mechanical units mounted directly on the one-piece body. These comprise a four cylinder, valve-in-head engine of 3.23 in. by 3.54 in. bore and stroke, a fluid coupling, a special five-speed transmission, a two-piece drive shaft, and a hypoid rear axle.

The engine has its four cylinders in one casting,



Latest model Simca convertible coupe. It is powered by a 51-hp. overhead-valve engine.

with wet liners, a light alloy head with inserted valve seats, and a three-bearing crankshaft. With a compression ratio of 6.7 to 1, the maximum horsepower, without fan and exhaust silencer, is 58-60 at 3700 rpm. The camshaft is double-chain driven and the generator and combined water-pump and four-blade fan have vee-belt drive.

Outstanding is the use of a fluid coupling combined with a special transmission. As the engine develops its maximum horsepower at a comparatively low speed, the fifth overdrive can be used for nearly all open road work up to a maximum speed of 85 mph. The fourth gear is the one for general use and on it the car can be started from rest and accelerated up to 74 mph without gear shifting. The third and second are for more rapid acceleration and the first is an emergency gear. Although a small plate clutch is fitted, its only purpose is to assist gear shifting.

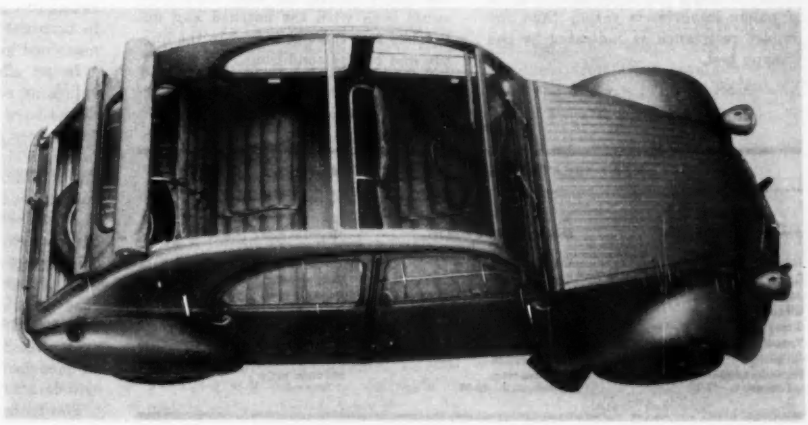
Transmission of the power to the hypoid rear axle, which has a ratio of 9-40, is by means of a two-piece shaft with rubber cushioned joints.

Coil springs are used for front and rear suspension. The front layout consists of pressed sheet steel support arms, with double acting hydraulic shock absorbers mounted inside the springs. Rear suspension is by coil springs supplemented by diagonally-mounted hydraulic shock absorbers, the anchorage of the axle being by means of flexible leaf spring radius arms, fastened under the axle housing below the coil spring and anchored forward to the body. Attached to the rear of the axle housing there is a transverse compensating bar which adds to the support.

Hydraulically-operated brakes have Al-Fin drums of 9 27/32 in. diameter with iron liners and centrifugal air ducts for cooling. The hydraulic brake system is to P. S. Baldwin designs. A hand-operated parking brake is mounted on the rear axle.

With a wheelbase of 104 5/16 in. and a tread of 52 in., a spacious four-door sedan body is provided. General layout is similar to that of the 1400, with a larger rear window. Two main body styles are provided: a sedan and a convertible, but platform chassis structures can be supplied for custom-built bodies. Weight

(*Turn to page* 80, *please*)



Citroen four - passenger convertible with two-cyl. aircooled engine and front wheel drive. United Press Photo.

By
H. H. Roberts

Technical Highlights at

WITH an attendance of over 65,000 persons, approximately 40,000 of whom registered as engineers, the 34th National Metal Congress and Exposition held last month in Philadelphia was by far the best-attended event of its kind ever held.

An entirely new feature was the establishment of a $650,000 Foundation for Education and Research by the American Society for Metals. Assets of the Foundation each year will provide an income of approximately $30,000 to be used for the advancement and dissemination of scientific knowledge, particularly with respect to the technology of metals, for the use and benefit of the public at large, either through education and research carried on by the Foundation or through the support of educational and research activities in established organizations and institutions. Trustees of the Foundation for Education and Research will be past presidents of the American Society for Metals, rotating in five-year trusteeships dating from the inauguration of their presidential terms.

Many new developments were on display. Westinghouse Electric Corp. had an X-ray image amplifier fluoroscope which is said to be particularly suited to the inspection of heavier castings. The fluoroscopic image is increased in brightness electronically so that the operator can view the part without exposure to the severe conditions of conventional fluoroscopy. Other new Westinghouse equipment was a 25-watt universal r-f induction heater with necessary controls for automatic or semi-automatic operation, and a gas-fired cycle annealing furnace with a retort size of 25 in. by 48 in. A feature of the furnace was the use of welded bands instead of tubing to carry gas and air.

A new natural gas Flamatic selective surface hardening machine was shown in operation by the Cincinnati Milling Machine Co. It was handling hundreds of

The Endurance Limit of Temper-Brittle Steel

By R. D. Chapman and W. E. Jominy
Chrysler Corp.

THE purpose of the investigation reported here was to determine what, if any, was the effect of temper brittleness as measured by the loss of notch toughness based on the Charpy impact test, as compared with the endurance limit in bending of steel at room temperature as well as at subzero temperatures. So often in the design of parts the endurance limit is of prime importance rather than the impact resistance as indicated by the Charpy test.

In this study the endurance limit was to be determined on the embrittled steel both at room temperature and at −35 F and compared with the endurance of the same steel in the same hardness range but which was treated to be ductile. The endurance limit was measured both in the notched and unnotched condition. Tensile properties of the steel were measured both with the notched and unnotched test specimens and in the ductile and brittle conditions.

Studying four SAE steels, Jominy has shown that of the SAE 8640, 4042, 1340 and 5135 all heat treated to the same hardness, the SAE 5135 had the highest transition temperature or showed the highest temperature where the steel changed from ductile to brittle fracture on impact. Therefore, SAE 5135 of the following composition was used in this investigation:

SAE 5135—0.37 C, 0.75 Mn, 0.22 Si, 0.016 P, 0.025 S, 0.05 Ni, 0.98 Cr, 0.02 Mo, 0.08 Cu.

The steel was received in 1⅞-in. diam round bars, which were forged and swaged to 11/16-in. diam. These were in turn cut into eight-in. lengths and machined to ¾-in. diam bars.

In an effort to obtain low impact values at room temperature, a group of the bars was heated to 2500 F for 30 minutes and furnace-cooled to form facets. This was done in a purified argon atmosphere to prevent decarburization. Bars were next normalized at 1700 F for one hour and all fatigue bars rough machined. After the machining operation, all the rough bars were plated with dense copper to prevent decarburization. The bars were then individually packed in charcoal, austenitized at 1550 F for ½ hour and oil-quenched in a fixture on revolving cylinders to maintain symmetry.

The fatigue bars were individually

TABLE I

HEAT TREATMENTS FOR TEST SPECIMENS

Heat Treatment No. 1	Heat Treatment No. 2	Heat Treatment No. 3
Normalize at 1700 F—1 hr.	Normalize at 1700 F—1 hr.	Heated to 2500 F in Argon for 30 min. —furnace cooled
Rough machined	Rough machined	Normalize at 1700 F—1 hr.
Copper plated	Copper plated	Rough machined
Austenitize at 1550 F—1 hr. at heat	Austenitize at 1550 F—½ hr. at heat	Copper plated
Oil quench	Oil quench	Austenitize at 1500 F for ½ hr. at heat
Stress relieve at 400 F—1 hr.	Stress relieve at 400 F—1 hr.	Oil quench
Temper 1150 F for 20 min. in salt	Temper 1050 F for 2 hrs.	Stress relieve at 400 F—1 hr.
Oil quench	Furnace cooled	Temper 1050 F for 2 hrs., furnace cool
Hardness range Rockwell C—27-30	Hardness range Rockwell C—25-30	Hardness range Rockwell C—29-30

Metal Show

small crankshafts made of Class A pearlitic malleable iron. Hardness achieved was Rockwell C 45-55.

American Pullmax Co., Inc., demonstrated the cutting of various types of metal on its sheet steel and plate cutting machines. A new power feed attachment was shown on a Major model Pullmax. With this attachment, the machine can cut ¼-in. mild steel at the rate of 25 fpm.

Capable of X-raying steel up to 3½ in. thick, a new midget-type industrial 250,000-volt X-ray machine introduced by General Electric Co. at the show, is less than half the size and less than one-eighth the weight of conventional quarter-million volt units. Its weight is only 150 lb.

Pangborn Corp. displayed a new Blastmaster Rotoblast machine. Made in two sizes, six and 12 cu ft, these Rotoblasts are said to be the first batch blasting machines designed specifically for the purpose.

Mechanical Handling Systems, Inc., demonstrated several components of a 12-station rotary shell molding machine. The complete machine will handle 12 large patterns at one time, and 500 shells per hour.

A new machine designed for cleaning piston pins was shown at the booth of Solventol Chemical Products, Inc. The fluid used eliminates fire hazards and toxic fumes, and is cleaned while recirculating.

Bonding of titanium to aluminum, metals bonded to ceramics, and other joining applications were demonstrated in a special setup by Eutectic Welding Alloys Corp. The new organic bonding agents, named Chemo-Tec, which were used, require no pressure equipment and little or no heat.

Platecoils made from a variety of alloys soon to go into production were shown by the Platecoil Division of Kold-Hold Manufacturing Co. Shortly after the first of next year the company will accept orders for units made of Hastelloy B, Hastelloy C, Ampco alloy, and Admirality.

Many other new developments were described in the October 15 issue of AUTOMOTIVE INDUSTRIES, starting on page 56.

The same enthusiastic interest displayed in the show also was apparent in the attendance at the technical sessions. Many interesting papers were presented during the week, and attentive audiences prompted much discussion. Abstracts of three papers follow.

TABLE II

CHARPY IMPACT VALUES OF SAE 5135 STEEL

Treatment	Room Temp. Impact at 75 F	Impact at −30 F
Normalized	100	75.0
Austenitized and	92.7	76.2
Tempered at 1150 F	90.0	82.9
Oil quench	91.3	78.0
Average	93.0	78.2
Heat Treat No. 1	Average Hardness—RC—29.5	
Normalized,	79.0	22.9
Austenitized and	77.8	26.3
Tempered at 1090 F	73.0	22.7
Furnace cool	72.3	20.5
Average	75.5	23.1
Heat Treat No. 2	Average Hardness—RC—30.0	
Heated 2300 F		
Normalized	39.7	19.0
Austenitized and	43.3	16.4
Tempered at 1050 F	43.7	16.8
Furnace cool	43.5	17.8
Average	42.5	17.5
Heat Treat No. 3	Average Hardness—RC—30.0	

TABLE III

ENDURANCE LIMITS FOR EMBRITTLED AND NONEMBRITTLED SAE 5135 STEEL

Treatment	Endurance Limit psi—Room Temp. Smooth Bar	Rockwell C	Notched Bar	Rockwell C
Nonembrittled (heat treat No. 1)	77,000	28	44,000	28
Embrittled (heat treat No. 3)	75,000	29	43,000	28
	Cold Temperature—Minus 35			
Nonembrittled (heat treat No. 1)	81,000	27	44,000	29
Embrittled (heat treat No. 2)	83,000	29	49,000	29

placed on these chain-driven rolls and oil was pumped over the hot specimen at the rate of about 60 gpm. The bars were immediately stress-relieved at 400 F for one hour and air-cooled. Subsequently, the material was tempered at 1050 F for two hours and furnace-cooled.

The heat treatment for the remaining bars was as follows: All material was normalized at 1700 F, copper-plated, austenitized at 1550 F for ½ hour at heat and oil-quenched, followed by an immediate stress relief at 400 F. The embrittled bars were tempered at 1050 F for two hours and furnace-cooled, whereas the bars considered as nonembrittled were tempered at 1150 F for 20 minutes in salt and oil-quenched.

The main difference in these last two treatments is the tempering temperature and the tempering times. The 1050 F temperature was first selected because it had been found to give the maximum embrittlement for this particular steel. Fig. 1 shows the familiar "C" curves for temper brittleness, and after two hours considerable decrease in impact values has occurred at 1000 F (540 C). Since it was desirable to maintain the same hardness from both heat treatments, a higher temperature for a shorter time without loss of impact was necessary. It was found that 1150 F temperature for 20 minutes in salt gave this result. The resulting hardness from these treatments gave a spread of from 27 to 30 Rockwell C

(*Turn to page* 128, *please*)

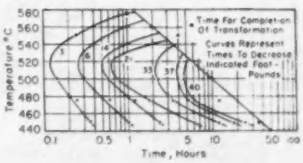


Fig. 1 — Time-Temperature-Transformation Diagram for Temper Brittleness Transformation (From Data of Greaves and Jones; Their Steel D).

The Machine Tool Market in Latin America

By George M. Galster

GEORGE M. GALSTER, author of this article, has been specializing in Latin American market research for a number of years and has prepared reports for AUTOMOTIVE INDUSTRIES on aviation manufacturing, the tractor market, the automotive replacement parts market, and now a study of the machine tool prospects.

In the article presented herewith, Mr. Galster discusses causes of expansion of the machine tool market, types of machines being imported by Latin American countries, and foreign competition for Latin American business.

Other articles by Mr. Galster which have appeared in previous issues of AUTOMOTIVE INDUSTRIES are as follows:

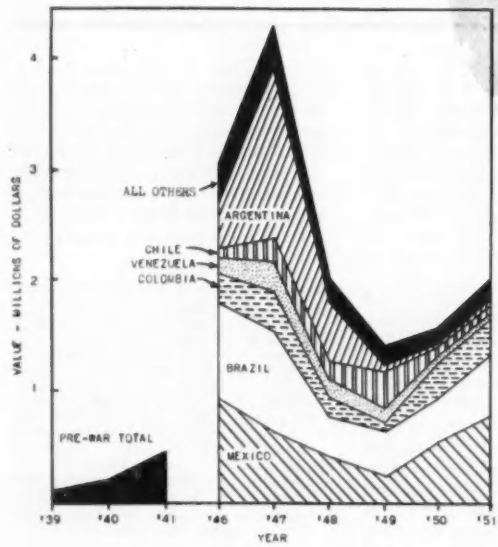
1—Latin America's Growing Aircraft Industry; October 15, 1947.
2—Our Future Export Market in Latin America; May 15, 1948.
3—Latin America's Importance as a Tractor Market; May 15, 1950.
4—The Potential Automotive Market in Latin America; June 1, 1952.

MACHINE tool exports to Latin America are showing a healthy upswing from the post-war low experienced during 1949 and 1950. Yet it is evident that shipments could be expanded at an even greater rate if defense production needs were not so acute here at home.

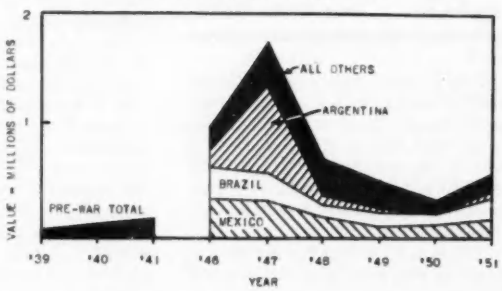
Actually, Latin American industrial importers are in a dilemma. For the first time in months, trade restrictions have been relaxed in most countries. And customers are demanding U.S.-made machinery because of advanced features and high quality workmanship. Yet most promised delivery dates are running well into next year, and orders for some specialized production equipment are not even being accepted in this country. Naturally this situation has opened the door wide to European suppliers.

Expansion of the machine tool market in the last decade is due largely to economic upheavals brought about by World War II. However painful the process may have been during 1941-1945, this period of enforced self-sufficiency in many fields mushroomed production facilities in Latin America at least 20

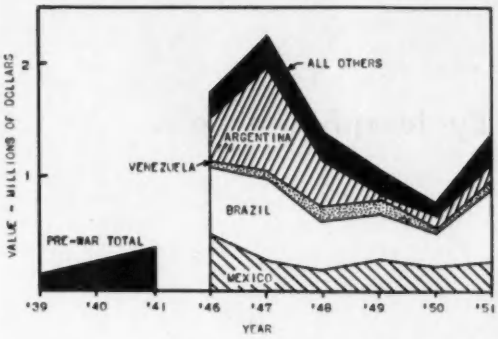
U. S. EXPORTS OF LATHES: BENCH, TURRET, BUFFING, ETC.



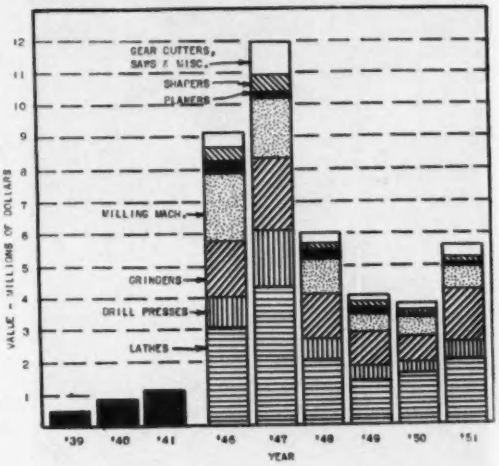
U. S. EXPORTS OF DRILL PRESSES



U. S. EXPORTS OF GRINDING MACHINES: SURFACE, TOOL, ETC.



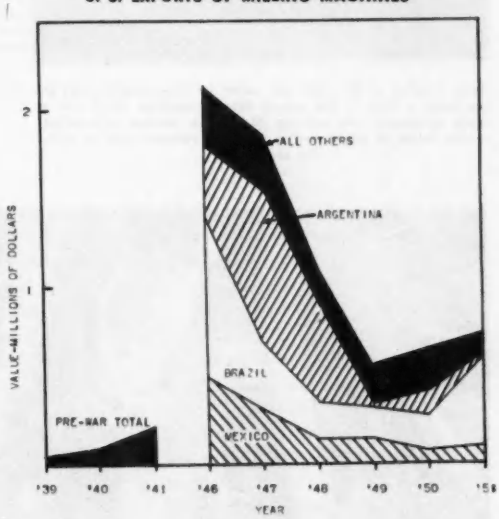
U. S. EXPORTS OF MACHINE TOOLS TO LATIN AMERICA



	Pre-War Avg.	1946-48 Avg.	1949-51 Avg.
United States	34	81	62
Germany	50	6	18
Great Britain	8	5	11
Others	8	8	9

SOURCE OF LATIN AMERICAN MACHINE TOOL IMPORTS
(Per Cent of Total Dollar Volume)

U. S. EXPORTS OF MILLING MACHINES



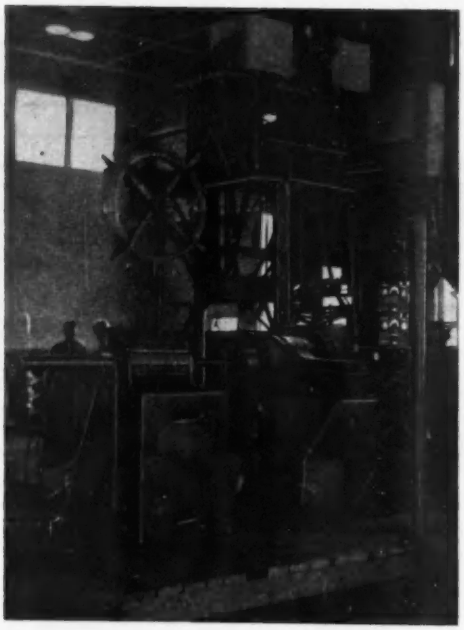
to 30 per cent. More advanced countries like Argentina, Brazil, Chile and Mexico now have well established local sources for steel and non-ferrous metals, rubber, chemicals and construction materials. Other countries, meanwhile, are rapidly progressing through the secondary industrial stages of supplying textiles, leather goods and other consumer commodities. The financial stability and increased purchasing power which stems from industrialization naturally are reflected in demand for all basic production tools.

Moreover, much of this industrial expansion was fostered during a period when the sources of new plant equipment were largely cut off. Thus, available machine tools were taxed to their limit refitting worn-out equipment and putting idle production machinery back to work. As a result of this deferred buying, 1946 and 1947 witnessed a veritable flood of orders for machine tools as well as miscellaneous equipment.

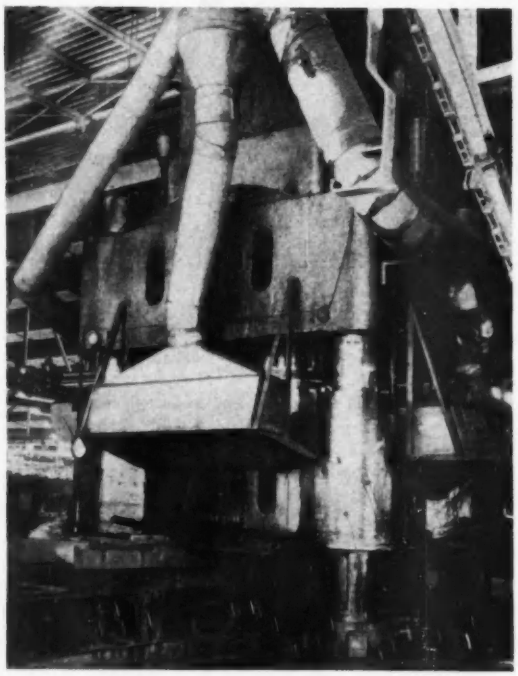
While this market has expanded volume-wise, the war also created a demand for the more specialized, precision type tools. Improved metallurgical practices and machine shop technology can be thanked for this trend. During the war, such items as intricate grinding rolls and crushers for the sugar industry had to be produced when imports were cut off. In railroad maintenance shops, cylinders, axles and valve mechanisms were turned out for the first time to keep depleted rolling stock in operation. Even though some of these wartime operations could not be continued in the competitive peacetime market, many foundries and machine shops have continued production of spare parts for Diesel and steam engines, replacement gears for production machinery, and a wide variety of special tools and fixtures for local industries.

Products of the machine tool industry compare favorably in quality to the best European and American standards. Where local rolling mill and foundry production is available, Latin American firms can compete price-wise with foreign manufacturers in all lines except standard mass-produced parts. In larger population centers, metalworking trade unions are increasingly important, and apprentice machinist systems are well established, stemming from government sponsored trade schools.

(*Turn to page* 106, *please*)



Seam welding of the plate and cover on the opposite sides of the banjo is done in this special Urschel machine, fitted with a Linde submerged arc welding head. The housing is installed in the fixture as shown and is revolved automatically to make the seam weld.



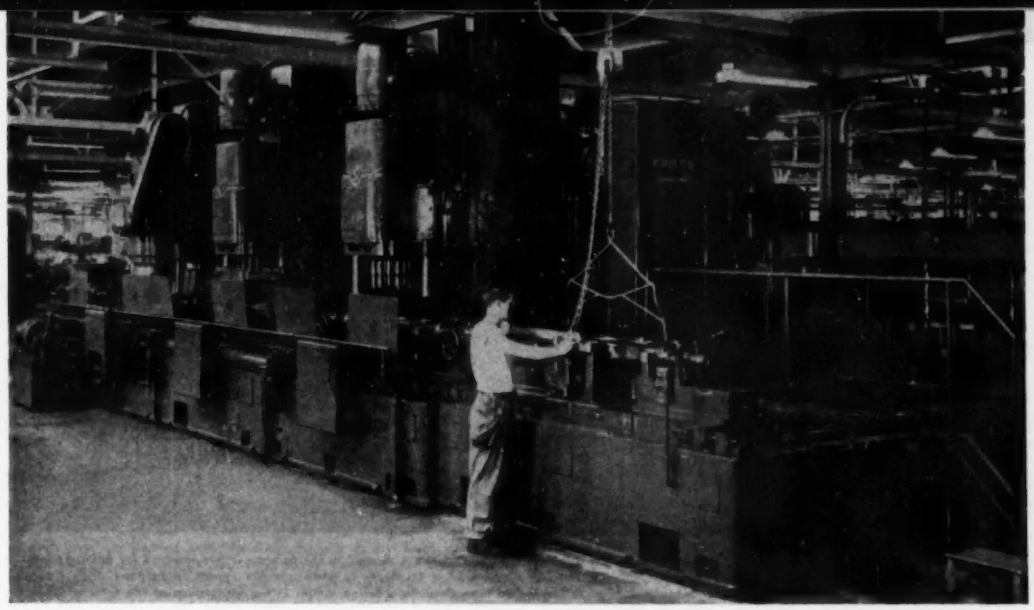
This is the mammoth 2500-ton Bliss hydraulic press used for hot pressing the halves of axle housings.

By Joseph Geschelin

Timken-Detroit's New Axle and

On the outskirts of Newark, Ohio, directly across the road from the site of ancient Indian mounds, the Timken-Detroit Axle Co. has in operation one of the most outstanding plants devoted to the manufacture of heavy duty axles. Known as the Ohio Axle and Gear Division, the new plant is of latest construction, with a floor space of 386,552 sq ft. At the present writing the facility is devoted to the making of front axles and tandem rear axles for 2½-ton military trucks; and heavy rear axles for five-ton military trucks. In addition, they also make transfer case assemblies for five-ton vehicles.

Typical of most plants currently tooled for military production, about half — or approximately 250 items — of the machine tools required for the operation have been acquired from Government stores. The remaining 250 or so items of equipment are entirely new and represent machine tools of the latest types known to the art. Incidentally, the Government tools were received in indifferent condition, and required considerable time and labor to tear down and rebuild. And, in some instances, special Government machines were rehabilitated and fixtured to handle entirely different jobs than those for which they were used in World War II.



Perspective view of the special Cross transfer machine tooled for a variety of drilling and boring operations on the banjo section. The first station is at the extreme right in the foreground, unloading being handled in the foreground. Note particularly the unusually large and massive fixture.

Gear Plant

Materials handling has been organized to an exceptional extent for an operation of this character. Not only are there extensive lines of monorail conveyors about 1944 ft long for linking operations, for handling parts in and out of heat treat and paint departments, but in certain instances the transfer of parts on and off conveyors is done automatically in a fashion quite similar to the techniques in some of the leading automobile plants. In addition, sub-assembly lines such as for the transfer case and rear axle carriers are of power-driven type; and there is an extensive merry-go-round type power-drive conveyor for final axle assembly, running 360 ft, carrying 60 assembly buggies.

In many places throughout the plant where heavy parts must be lifted in and out of machines or transported to sub-assembly and final assembly operations, the immediate working area is provided with an overhead craneway fitted with electric hoists to facilitate handling. In all this plant boasts an installation of 114 electric hoists. It is of interest that all craneways and assembly lines are served by an installation of Bull-Dog Trol-E-Duct to supply power. Power for the machine lines is made available through an extensive installation of Westinghouse bus duct.

Supplementing the materials handling facilities mentioned above are industrial trucks of a variety of types and makes.

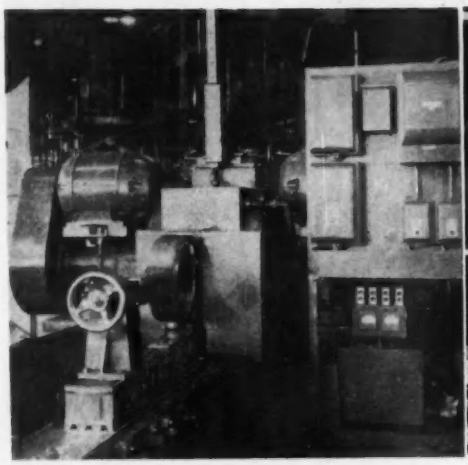
Backbone of the heavy duty rear axle is the massive and structurally stiff banjo type housing. It is made up of two symmetrical sections formed from thick steel blanks, welded together by the Linde Unionmelt process. Blanks are received in bundles and fed in stacks to the transfer mechanism serving the heating furnace. As illustrated, this station holds a stack of blanks and at the proper time transfers the blanks to an elevating mechanism directly at the entrance of the furnace. Here a transfer bar automatically moves the blanks one at a time onto the furnace conveyor.

The blanks are heated to a temperature of 2000 F in preparation for hot forming in a two-station die in the big 2500-ton Bliss hydraulic press. Following this the formed sections are degreased, then shot-blasted, and are ready for welding.

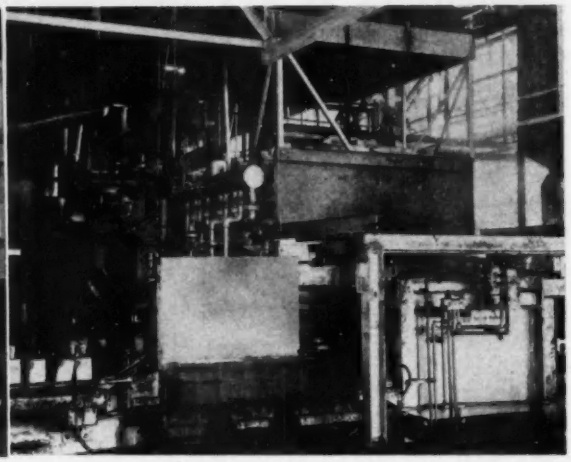
Welding operations unique to this type of product are handled in a variety of special equipment. For example, the two halves of the banjo are joined in a large welding machine fitted with two automatic Linde Unionmelt heads. The work is held in an enormous fixture and clamped hydraulically. The submerged arc welding heads weld along the seams across the length of the banjo. Upon completion of one side, the fixture is rotated to present the opposite side.

The housings then are put through a large Gardner surface grinder of two-wheel type for grinding both sides of the banjo center section.

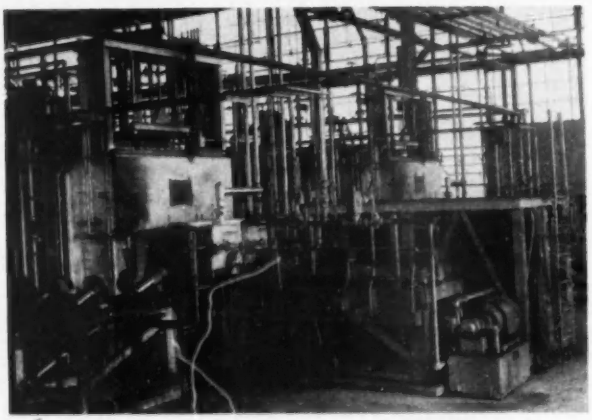
Each banjo requires the welding-on of a thick plate on one side, and the pressed steel cover on the other



Closeup of double-end Gardner surface grinder used for grinding both sides of the banjo housing in preparation for welding operations in the special Urschel machine.



Axle housing blanks are heated in the furnace in preparation for hot pressing. Blanks are loaded in stacks as shown in the center foreground, then transferred to the automatic loading device in the foreground at the extreme right.



View in the heat treat department showing one of the large battery of new Surface-Combustion furnaces installed here.

Preliminary machining of axle shafts is done in a battery of Model AR Lo-swing lathes, machining the flange and opposite end simultaneously.

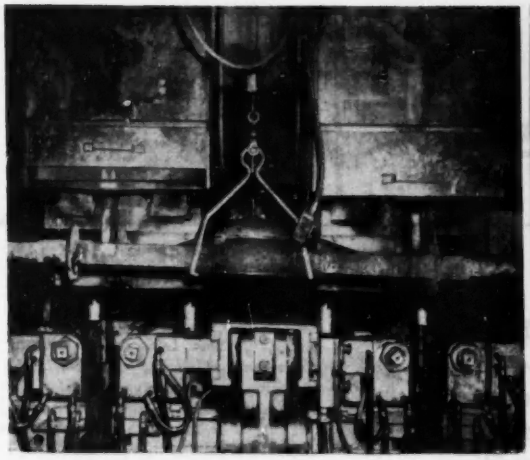


side. Both operations are performed simultaneously in the Urschel welding machine shown here. The housing is installed in the fixture, as shown, with the plate on one side and the cover on the other and the entire assembly clamped securely by hydraulic means. The two Linde submerged arc welding heads then come into play to seam weld both parts while the axle housing is rotated by the fixture.

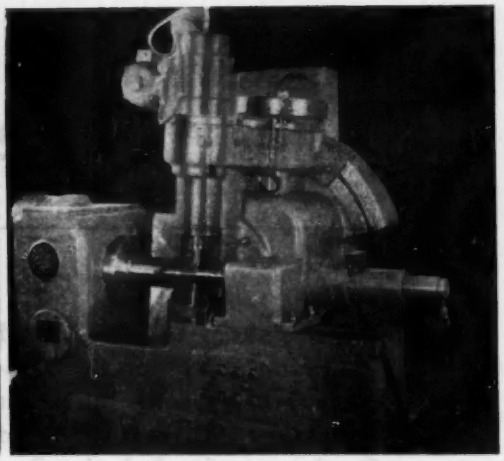
Another outstanding welding job is the butt-welding of axle ends to the housing. This is done in double-end butt welders, made by Swift and National Welders, one of the machines being shown here. An interesting feature of these machines is the provision for automatic clamping to assure correct alignment, as well as calibrated horizontal pressure regulation to control overall length after the butt weld has been completed.

One of the most impressive features is the adoption of a large Cross Transfer-matic for machining the carrier section. The illustration shows a perspective of this heavy duty eight-station machine, tooled for rough- and finish-boring the top and bottom bore diameters; rough- and finish-facing the carrier face; chamfering, drilling, spotfacing, and tapping the filler hole; drilling and chamfering the carrier holes.

Because of the size of the work—about 72 in. overall length—and the



Axle ends are welded onto the banjo housing in the Swift double-end butt welder seen here. This view shows the method of lifting the finished job out of the machine by means of a hoist and special sling.



This is one of the two new Michigan Tool ultra high speed gear hobbers which have been installed in the plant. The machine is said to have outstanding productivity, using multiple-lead hobs.

need for maintaining close control of all related operations, the machine has been designed for the transfer of individual fixtures in which the work is held securely clamped from start to finish. As shown, the fixtures are large and massive, running about 96-in. in length and weighing about 1000 lb each.

Operation of the entire machine is entirely automatic with transfer of fixtures in sequence with the machine cycle. Work is loaded at the first station and checked in the fixture to assure proper location of the carrier face. The carrier face diameter is rough-bored at the second station. At the third station the carrier face is rough-faced; and the filler hole is drilled and chamfered. The fourth station does the finish-boring of the upper and lower bores, holding the major diameter to 11.875-11.880 in. The carrier face is then finish-faced at the fifth station.

The sixth station drills 12 carrier holes and spot-faces the filler hole. The seventh station chamfers 12 carrier holes and taps the filler hole. The eighth station is for unloading.

The Cross transfer machine, described above, is tooled for 2½ ton axle housings, machining of the three axles required for a set being the same. For their part, the operators are required to load the work in such fashion as to have complete sets—one front and two rear—loaded in sequence in the machine fixtures to assure balanced production.

The axle ends, which include diameters for bearing mounting, then are ground in two successive operations in Cincinnati centerless grinders. In addition, the inner bearing radius is shot-peened in a special American Wheelabrator machine to greatly increase durability.

Axle ends on 2½-ton axles are threaded in Ex-Cell-O thread grinders; while five-ton axles are threaded in a single-end Lees-Bradner machine.

Among the noteworthy items of machine tools are a group of five of the new Model AR Lo-swing automatic lathes. Four of these are used for machining miscellaneous parts, one is tooled for machining rear axle shafts. This is a multiple tool lathe set up for machining the flange end as well as the opposite end simultaneously. On the flange, the lathe finishes the OD and faces the inner face. Despite the heavy metal removal required in this set-up, the lathe produces at the rate of 22 axle shafts per hour.

It is of interest too that after Lo-swing machining, the entire length of the shaft—from the inner face of the flange—is green-ground in a Norton cylindrical grinder. This operation is handled with a large wheel, having a face width of 12 in.

Axle shafts are heat treated in a battery of two Holcroft furnaces. They are first heated, then quenched in a Gogan roll-quenching fixture, then drawn in the second Holcroft furnace. As the final operation, axle shafts are shot-peened all over in a special American Wheelabrator machine to impart an exceptional increase in durability.

Gear making is one of the major activities. In the interest of economy the entire gear making operation has been centralized in one corner of the plant and is adjacent to the heat treating department. Gleason equipment is found in profusion, including 34 machines since Timken axles use bevel gears, spiral bevels, and hypoid gear sets. Among the items of Gleason generators are some of the new 26-in. machines, the largest made for this purpose.

Too, this department boasts a group of 36-in. Fellows gear shapers; Barber-Colman gear hobbers; Cleveland hobbing machines; and Lees-Bradner multiple spindle hobbers.

Particularly noteworthy is an installation of two of

(*Turn to page* 94, *please*)

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Gear Makers Discuss Industry's Important Problems at Semi-Annual Meeting. Westinghouse Sponsors Materials Handling Conference for Industry Benefit. Joseph P. Crosby of Lapointe Machine Tool Co. Provides Information on the Foreign Tool Shows in a Special Report. Machine Tool Electrification Topic of AIEE Meeting.

Materials Handling Conference

The Fourth Biennial Materials Handling Conference, sponsored by Westinghouse Electric Corp., held in Buffalo last month was attended by 175 people representing approximately 50 companies. At one of the technical sessions Steven W. Jessop, of Jervis B. Webb Co., Detroit, Mich., stated that industry is demanding more fully integrated material handling systems, from receiving through manufacturing processes to storing, shipping, and recording. By integrated, Mr. Jessop also meant synchronized, timed, one operation to the next, and designed so that the old cumbersome transfer points are fully and safely automatic. According to Mr. Jessop, the day has arrived when electrical controls must be built into conveyor systems as an integrated part of the equipment.

R. C. Sollenberger, executive vice president, Conveyor Equipment Manufacturers Association, declared that mechanization is the primary source of new jobs, higher incomes, and better living standards. It was stated that employe welfare is more closely related to productivity than any other single factor, and the improvement of productivity depends almost entirely upon an increased use of mechanized equipment. Mr. Sollenberger said that studies made by his association indicate that materials handling accounts for more than ⅓ of all manufacturing cost and that in the average American plant these costs can be cut in half by modern mechanization and systematic planning.

A great deal of interest was reflected by the banquet speaker, Paul Wooton, Washington Member, the Chilton Editorial Board. The title of Mr. Wooton's presentation was, "What I Am Hearing in Washington." He commented on Washington reaction concerning the current election, and predicted the outcome of the presidential race.

Gear Meeting

Approximately 250 people associated with the gearing industry attended the Semi-Annual Meeting of the American Gear Manufacturers Association in Chicago last month. This year's program included the usual meetings of the various gearing committees as well as a technical paper on the scoring phenomena of gears and a paper on machinery replacement.

Bruce W. Kelley, research engineer, Caterpillar Tractor Co., stated in his paper, "A New Look at the Scoring Phenomena of Gears," that scoring is becoming a real problem now that the engineer prefers a lighter non-additive oil. He went on to say that more accurate formulas are needed to cope with the lesser ability of light oils to provide scoring protection. Mr. Kelley listed seven factors as having significant effect on scoring resistance. These are: pressure, absolute surface velocities and the resultant relative sliding velocity, viscosity and composition of the oil, temperature of the oil bath, properties of the material, surface finish, and surface treatment. Since these factors are all common variables of modern gearing practice, formulas must take proper cognizance of them to be an effective design tool, according to Mr. Kelley.

In a paper entitled, "Economics of Machinery Replacement," Robert S. Collier, plant manager, the Cincinnati Milling Machine Co., stated that the industrial strength of this nation is based upon the early replacement of its obsolete facilities and today as never before must we be industrially strong. He also stated that no live industry can keep pace with the advance of technology without continuous renewal and transformation of its productive facilities. Existing equipment must be kept on the defensive compelled always to justify its tenure against the challenge of new and modern machines. If any piece of existing equipment fails to meet this challenge, it must be displaced regardless of its age or condition, and regardless of whether it is physically worn out. Any equipment that fails to give full recognition to obsolescence is bound to lead to bad mechanization and inefficiency.

It was also reported at the meeting that E. L. White has retired from the staff of the AGMA after serving for almost 20 years. Mr. White originally started in the gearing industry in 1905. He has been replaced by R. F. Klose who was formerly with the Mesta Machine Co.

Special Report on British and German Machine Tool Expositions

By Joseph P. Crosby, Vice President
THE LAPOINTE MACHINE TOOL CO.

My first impression of the Machine Tool Exposition at Olympia Hall, London, England, was of the tremendous amount of machine tools being exhibited in one Exhibition Hall. It was bigger than the National Machine Tool Show in Chicago in 1947, and even more extensive insofar as space is concerned, than the great ASTE Show in Chicago this past winter.

In general, I saw nothing that we had not previously known or seen in this country. There were some American-made machine tools shown at the Exposition, and these, although not as streamlined in design as the English machines, were performing equally as well as any English machine tool. Appearance of all foreign machines exhibited at Olympia was high calibre.

The development of the jet engine, with its special requirements is exercising a notable interest on machine tool design. The special problems found in the machining of rotors, casings and other components has definitely effected the machine tool industry.

At the Exhibition were several types of "T" lathes in which the spindle is at right angles to the edge for machining large diameters.

There were approximately 15 exhibitors showing tracer lathes, and it appeared that all lathes were about equal to ours in appearance for rigidity and automatic attachments.

There were 27 exhibitors showing copy millers. The spindle speeds were comparable to those found in machines built in this country. The standard milling machines did not appear to be up to our standard millers in rigidity.

At Hanover, West Germany, I was impressed more by the size of the Exhibit, rather than any outstanding feature of any machine. The Exhibit is three times that of Olympia in London, and even this space appears inadequate, for one exhibitor was showing a turret lathe in a glass encased truck on the outskirts of the Exhibition grounds, and another lathe was being exhibited in an alley back of my hotel in the center of Hanover.

It is almost impossible to realize how Germany has come back in the manufacture of machine tools in the short space of four or five years.

A typical example is a manufacturer of large, heavy machine tools used in rolling mills. He had before WW II owned three substantial machine tool plants in Germany. They were totally destroyed during the War. The head of the company was put in jail until 1948 as a War instigator. On being released from jail, with his factories destroyed, and his resources eliminated, he was able to reestablish one of his factories, and is well on his way to establishing a second factory. At present he employs 1200 workers, and I would estimate that the machines he had on exhibition amounted to over a million dollars.

There was one machine, an electric drive planer 10 ft by 10 ft by 36 ft that was built as rigidly as any machine tool I had ever seen. It was demonstrating a large cut on a piece of stainless steel, and to show the rigidity of the machine, a coin was balanced on the crosshead during the cut. This machine has a selling price of $350,000, and was being shipped to Tokyo, Japan. All the machines at this company's exhibit were built for rolling mills.

There was one innovation in a Swiss copy lathe by Fischer on which the carriage ran vertical to allow the chips to fall into a pan. This innovation could be attractive in some of the higher production jobs.

There was also a lathe cutting lead screws with a fly cutter, and the lead screw was cut to full depth in one pass.

In general, I don't feel that any of the machines exhibited were better than those manufactured in the United States. There were, however, some presses that looked very impressive. The standard machine tool didn't appear to have the rigidity and power to stand up under the high production demands in this country.

In summary, there are some features of the foreign market that give us confidence. A British automotive manufacturer told me that if it was possible to obtain dollars, he would always buy American-made machine tools, rather than those manufactured in England, or on the Continent. He stated that the reason for this statement was the fact that American built machine tools only had one-tenth of the down time of other machine tools. This fact, alone, would pay for any difference in price between the American and foreign built machine tools.

More Observations by Crosby

In England, their deliveries average five to six years for machine tools.

There are some points not in our favor, such as the average wage scale for a mechanic in England is about 75¢ an hour, and the average wage scale is about 40¢ an hour in Germany. This is definitely tough competition, and no doubt the American manufacturer will feel it within a year or two, insofar as the foreign market is concerned.

In Hanover there were 65 manufacturers of large engine lathes exhibiting.

In England, it is possible to work only one shift a day. There is a manpower shortage to such an extent that it is practically impossible for a new manufacturer to start a factory in England.

There is one American company, that I heard of, desiring to build in England, and could only get permission to build in Northern Ireland, because of the manpower shortage in England.

While I was in England, there was a falling off of automotive orders on the more expensive cars. Rather than

(*Turn to page* 174, *please*)

NEW EQUIPMENT PLANT • PRODUCTION

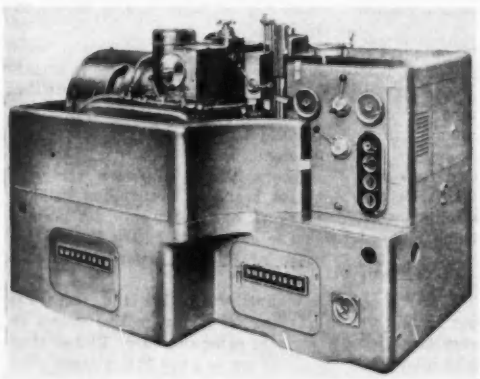
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Precision Gear Grinder

Production has been announced of a high precision gear grinding machine. This gear grinder is claimed to be capable of producing gears at a high rate and with constant uniform accuracy.

The grinding method is said to be unique in that the periphery of the wheel is formed with a helical rib by a combination of Crushtrue and diamond dressing. A gear blank mounted on a mandrel between vertical dead centers, rotates continuously at a set rate in direct relationship to the grinding wheel, into which it is fed. Work drive and grinding wheel drive are interconnected by gearing which can be changed as required by the number of teeth to be ground.

Without stopping the grinding wheel, work can be removed from the machine for inspection and when replaced, is automatically properly located without further adjustment. Two additional sets of gears provide for selecting the helical lead and for controlling the speed at which the work is fed past the wheel. The operation resembles gear hobbing with the helical ribbed wheel taking the place of the gear hob. In addition, the work rolls across the full width of the wheel so that the involute form is generated entirely automatically.



Sheffield precision gear grinder.

The machine will accommodate gears up to eight in. diam and will grind up to four maximum length of teeth. Pitch range is from a minimum of 50 diametral to a maximum of eight diametral of 0.4 circular. Quantities of gears of 16 diametral pitch and finer can be ground simultaneously from the solid. Maximum helix angle of teeth is 45 deg. Helical and spur gears of the same pitch can be ground with the same wheel without redressing. The helical ribbed wheel enables any diameter gear to be ground of similar diametral, circular or module pitches without any additional setting up of the machine except for changing the change gears for the proper number of teeth and repositioning the wheel for the new diameter. *Sheffield Corp.*

Circle E-1 on page 65 for more data

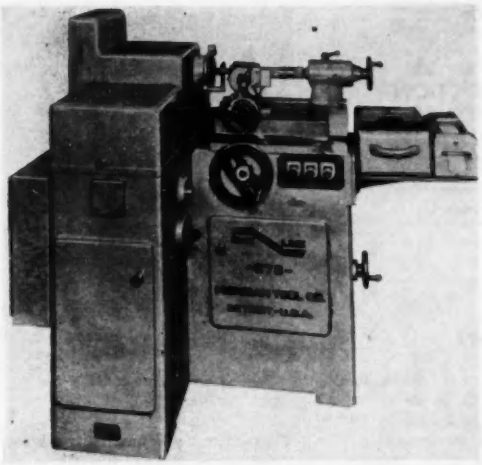
Polishing Head for Jet Parts

Developed especially for the deburring of turbine disk-slots a recently announced polishing head incorporates several universal-positioning features. The head may be used with either wheels or buffs and is compact in design. Heads may be readily removed or added if found necessary. (Murray-Way).

Circle E-2 on page 65 for more data



Hob and Worm Lead Checker



Michigan hob and worm lead checker, Model 876.

Model 876 Sine-Line hob and worm lead checker has been placed on the market. In addition to inspecting leads on hobs and worms, the Model 876 will check hob flute spacing and thread spacing on multiple thread hobs. An auxiliary fixture can be mounted on the machine in place of the indicator head to check hob pressure angle.

The lead checker can be hand-operated or motor driven. Automatic recording equipment can be provided to work in conjunction with the checking machine.

In checking leads, the rotation of the hob or worm spindle and translation of the indicator table parallel to the hob spindle is effected by a sine bar table on the machine base.

A master rack mounted on the sine bar table engages a pinion that drives the hob spindle through master change gears. The indicator table is held against the sine bar with constant pressure.

The machine is set up to check a given lead by selecting change gears according to a table included with a formula sheet, and calculating the correct sine bar setting. Deviations from true lead are shown in ten-thousandths of an inch.

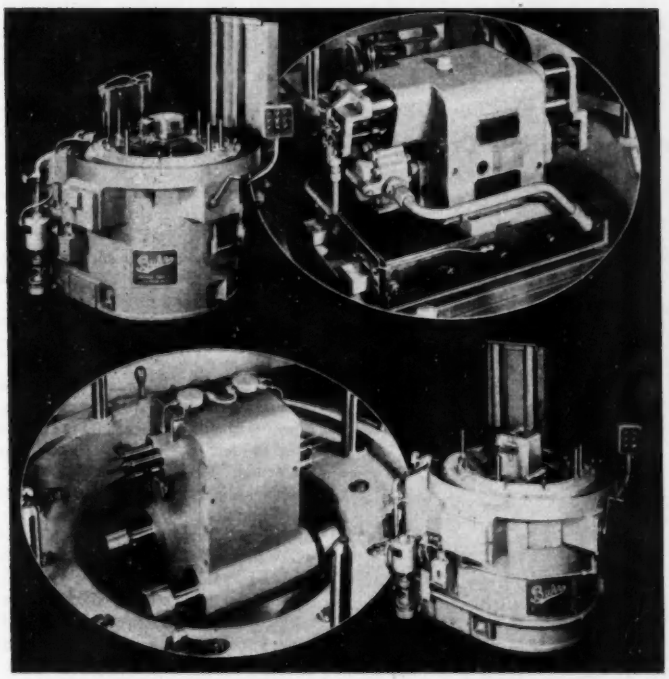
Index plates are used to check hob flute and thread spacing. Two table drive speeds are provided. An indicator table rapid return mechanism speeds checking operations.

The Model 876 lead checker has a hob capacity of from ¼ to eight in. diameter. Maximum spread of centers is 13 in. The machine will check right or left hand leads from zero to 7.2 in.

It is powered with a ¾-hp 1800 rpm motor. Machine dimensions are: height, 53½ in.; width, 64 in.; and depth, 45½ in. *Michigan Tool Co.*

Circle E-3 on page 65 for more data

Drilling and Tapping Machines for Turbojets



Drilling and tapping 24 unevenly spaced blind holes on the inside of a jet-engine bearing support is being done by two special machines. A reciprocating-type drill-head mounted on a hydraulically-operated way-type slide and includes four drill spindles at each end is used. Drills are driven by a hydraulic motor.

Each machine is also equipped with a special rotary table which features irregular spacing. However, the table is electrically interlocked in such a way that the holes can be drilled only in their proper relative positions.

The tapping machine functions on the same principle as the drilling machine, except taps are driven by a master lead screw. (Buhr Machine Tool Co.)

Circle E-4 on page 65 for more data

Box Wrenches



Head walls have been reproportioned to improve the efficiency of structural box and offset striking-face box-wrenches. Proportionately thinner head walls are said to permit the use of these wrenches on a broader range of American Standard bolted flanges and flanged couplings. (J. H. Williams & Co.)

Circle E-5 on page 65 for more data

(*Turn to page* 58, *please*)

NEW EQUIPMENT PLANT • PRODUCTION

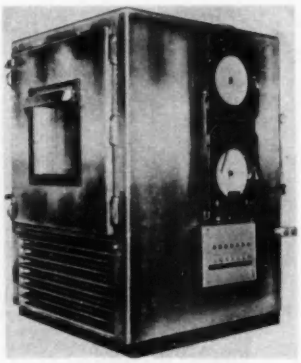
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(*Continued from page 57*)

Temperature-Humidity Test Chambers

To supply industry with a standard line of environmental test chambers for conducting temperature-humidity tests, the maker has standardized on five basic chamber types. These chambers automatically maintain humidity from 20 per cent to 95 per cent through a temperature range of 35 F to 185 F. Minimum dew point is 33 F.

The chambers, known as the Tenney TH Series, come with the following inside dimensions: (1) 22 in. by 19 in. by 48 in., (2) 42 in. by 18 in. by 48 in., (3) 36 in. by 31 in. by 36 in., (4) 42 in. by 24 in. by 48 in., and 48 in. by 24 in. by 48 in. Models 1 and 3 have one door; the others have two. Common to all models are accurately calibrated indicating thermostatic controllers, air circulating blowers for uniform movement of air, and stainless steel interior and exterior paneling.

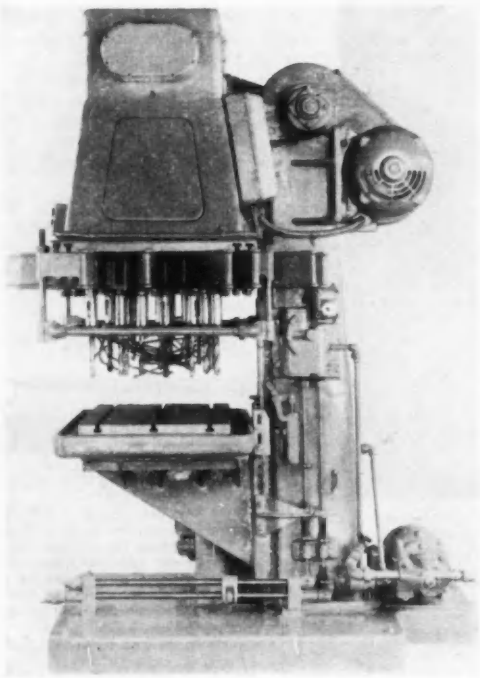


Tenney temperature-humidity test chamber.

Four types of control are incorporated in the Tenney TH Chambers —constant humidity, constant temperature; constant humidity, varying temperature; varying humidity, constant temperature; and varying humidity and varying temperature. *Tenney Engineering, Inc.*

Circle E-6 on page 65 for more data

Hood Type Multiple Drilling Machine



Root hood type multiple drilling machine.

Recently developed is a hood type multiple driller for drilling aircraft alloys. This Style F400 machine is a rectangular hood type machine with universally adjustable spindles. The hood has an 18 in. by 36 in. rectangular drilling area with provision for adjusting the spindles to any point in the hood area.

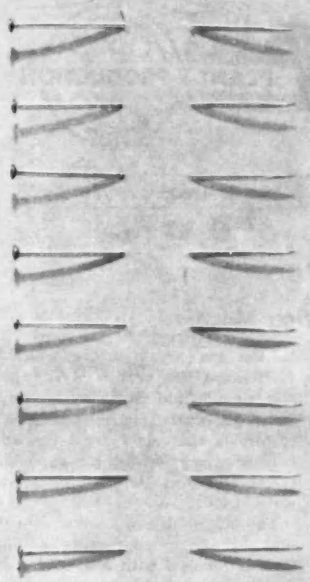
A 10 hp motor drives the spindles through a variable speed mechanism, allowing the adjustment of the spindle rpm to suit various size holes and materials.

Hydraulic table feed is employed, providing the following features: Rapid table traverse allows rapid advance to point of drilling, normal drilling and rapid return. Foot treadles control the feed stroke, allowing the table to be started, stopped or reversed at any point of the feed or return stroke. The feed rate is stepless, providing the most advantageous feed rate for each drilling job.

A coolant system, with reservoir, pump and flexible spouts directs a stream of coolant to each drill. *B. M. Root Co.*

Circle E-7 on page 65 for more data

(*Turn to page 60, please*)



Fabricators looking for
shipment-to-shipment
STEEL UNIFORMITY
have found it at
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The reason:
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(Continued from page 58)

Pressure Testing Machine

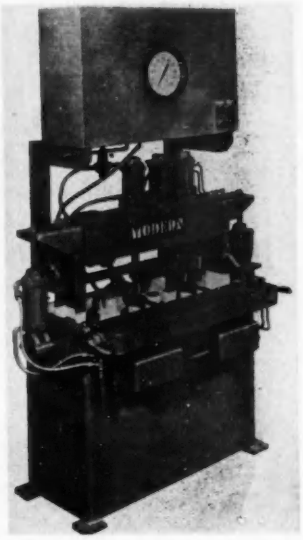
A pressure testing machine that detects and locates leaks in gas passages in cast iron automotive engine exhaust manifolds has been brought out. In operation manifolds are manually loaded into the test area of the machine where the exhaust gas areas are sealed in three planes by rubber-faced, air cylinder-controlled sealing pads.

The resulting pressure buildup in the air cylinder control circuit when the pads contact the manifold causes an automatic air test cycle to start. The manifold is then charged with a specific volume of air that is trapped in the gas areas of the manifold.

Pressure loss over a given preset test time is indicated by a gage in the head of the machine. Leaks in manifolds that show excessive pressure loss are located by immersing the head in a built-in illuminated water tank.

The manifolds are lowered into the tank by air cylinder controls. The tank is finished with a special paint that provides maximum light reflection to the part.

The manifold is raised from the immersion test by the air cylinder controls and can then be marked with chalk indicating areas that should be impregnated with suitable material to pass pressure test specifications. *Modern Industrial Engineering.*



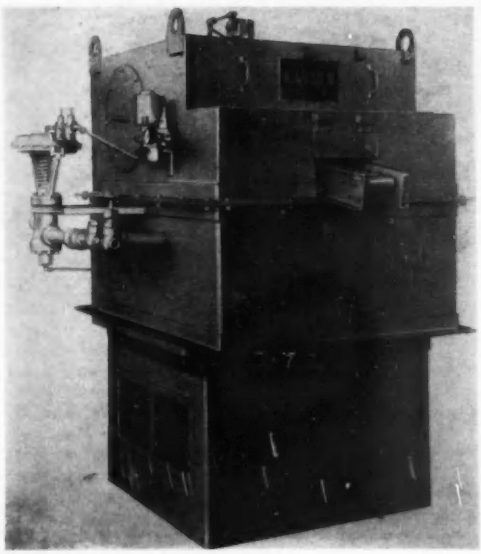
Modern Industrial pressure testing machine.

Circle E-8 on page 65 for more data

Automatic Descaling Cabinet

An automatic billet descaling cabinet with a removable scale basket has been announced. It is equipped with a gravity conveyor head, is fully automatic in operation, and is available in both pit-mounted and floor-mounted types. The spray ring is fitted with six spray nozzles which completely encircle the billet. Nozzles are directed at both ends of the billet so as to completely remove scale at both ends.

The roller conveyor is arranged to withstand extreme temperatures, and the unit is of all welded steel construction with rustproof screening in the scale basket. It can be supplied complete with necessary operating controls for use with existing accumulator system, or with suitable accumulator system and pumps. (American Steel Foundries, Elmes Engineering Div.).



Circle E-9 on page 65 for more data

Hydraulic Clamp for Small Lift Truck Operation



A 2000-lb electric truck with clamping attachment, for the handling of light weight packages in storing areas, on docks, and in highway trailers, is available.

The hydraulically powered clamp will open to accommodate crates as wide as 60 in. It can lift these crates up to 130 in. for stacking. (Yale & Towne Manufacturing Co.)

Circle E-10 on page 65 for more data

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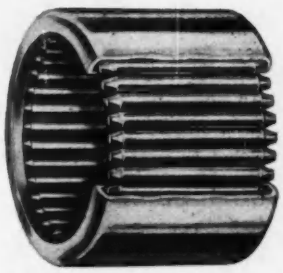


light weight carries the load

Torrington Needle Bearings are light in weight, compact. They effect weight and space savings in housings and other related parts—*without* sacrificing strength or efficiency.

The reason is simple: Needle Bearings have greater rated radial load capacity in relation to size than any other type of anti-friction bearings.

So if your design needs a bearing light in weight to handle heavy loads, investigate the advantages of Torrington Needle Bearings. Our engineers will welcome the opportunity to assist you.



THE TORRINGTON COMPANY

Torrington, Conn. South Bend 21, Ind.

District Offices and Distributors in Principal Cities of United States and Canada

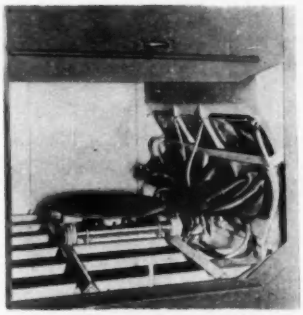
TORRINGTON NEEDLE BEARINGS

Needle • Spherical Roller • Tapered Roller • Straight Roller • Ball • Needle Rollers

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 65

(*Continued from page 60*)



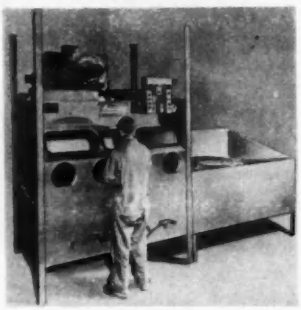
Wet Blasting Machine Has 3500 Lb Capacity

The addition of a new model to a line of wet blasting machines has been anonunced. Known as the Model 64 Liquamatte, it is intended for all precision cleaning and finishing applications involving large and heavy pieces.

This machine, sized six ft in length by six ft 10½ in. in depth by eight ft 11 in. in height, will handle single pieces or loads of pieces up to 3500 lb. It has two counter-balanced doors and has a six ft long accessory tank to receive the parts from the blast chamber for rinsing.

Fine mesh abrasives, suspended in water, are propelled at the work by compressed air. The Model 64 has two sets of armholes so that two operators can be accommodated at once. Otherwise, one operator can occupy any one of three positions. There are three abrasive nozzles, individually controlled. Different sized jets are used in each nozzle. *American Wheelabrator & Equipment Corp.*

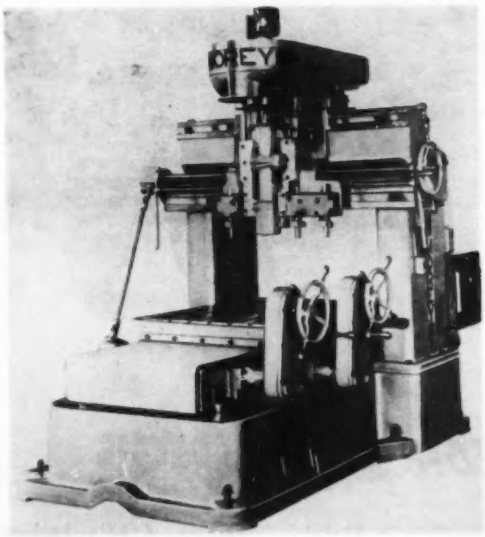
Circle E-11 on page 65 for more data



Two views of the American Wheelabrator wet blasting machine.

Milling and Profiling Machine for Large Aircraft Forgings and Castings

A machine specifically designed for the milling and profiling of large forgings and castings such as aluminum and magnesium air frames, as well as cast iron parts and steel forgings, has been developed. The No. 40M heavy duty vertical "Aeroframe" profiler and milling machine takes full advantage of tungsten carbide tools. It is equally useful for heavy cuts in irregular-shaped steel forgings and castings.



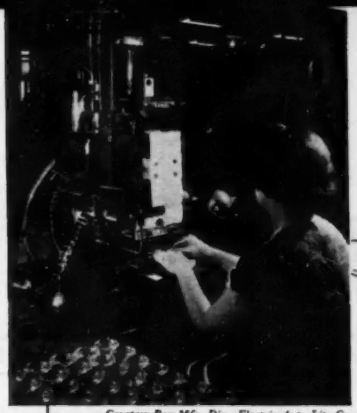
Morey milling and profiling machine.

The 40M has a two-speed 15 hp motor and operates through a back-geared drive to provide a spindle speed range of 125 to 4600 rpm.

Several significant design improvements are incorporated in this single-spindle, bridge-style profiler and milling machine. The cross head is mounted in balance on a vibration-damped cross rail. Bridge columns are designed for the addition of raising blocks to increase bridge clearance. Anti-friction bearings are used throughout the machine. A simple adjustment to take up all backlash in control gears enables the operator to control milling to very close tolerances. *Morey Machinery Co., Inc.*

Circle E-12 on page 65 for more data

Multi-colored plastic ornaments on automobiles were hand painted luxuries a few years ago. Now, with the help of a bit of Silastic, they are mass produced to decorate even the least expensive models.



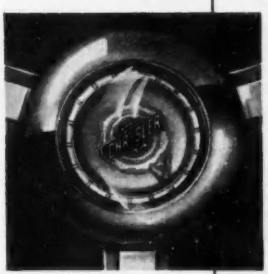


Courtesy Boy Mfg. Div., Electric Auto-Lite Co.

as a die for hot-stamping pigmented foil

SILASTIC* works

where other materials fail



One of the problems in developing this process was to find a material for hot-stamping pigmented foil. Specifications called for a die-tip that would remain resilient and not stick to the foil after thousands of impressions at surface temperatures in the range of 500° F.

After trying many materials, that problem was solved at the Electric Auto-Lite plant by using Silastic. For more than 3 years the same Silastic tips have been used, and none of them has worn out, lost its flexibility or peeled off its metal backup plate.

Retention of rubbery properties at temperatures ranging from −100° to over 500° F makes Silastic unique among rubberlike materials. Combine such stability with excellent resistance to oxidation, to outdoor weathering, and to a variety of hot oils and chemicals, and you have one of the most useful of gasketing and sealing materials. Combine those with good dielectric properties, and you have an ideal insulating material for transformers and traction motor field coils, Navy control cable, and ignition cable for aircraft and ordnance vehicles.

*T. M. Reg. U. S. Pat. Off.

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DOW CORNING CORPORATION

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Silastic may be the rubbery material that can solve your production problem or give your product a profitable sales advantage. Mail this coupon or call our nearest branch office.

Dow Corning Corporation, Dept. C-23, Midland, Mich.

Please send me:

☐ Silastic Facts 10a with new data on properties and applications of all Silastic stocks and pastes.

☐ "What's A Silicone?", your new 32-page booklet on silicone products and applications.

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NEW PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65



Hydraulic Axle Jacks for Trucks

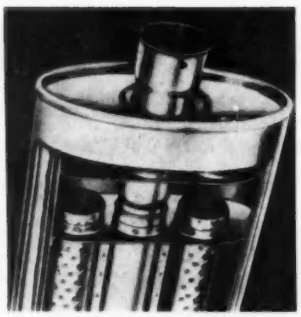
A line of hydraulic axle jacks for use with light and medium trucks and other lifting, spreading or straightening applications is now being marketed. Available in three models, 1½-ton, three-ton and five-ton capacities, the jacks are engineered for vertical or horizontal operation and have an enclosed pump design which prevents dirt from clogging pump action.

The 1½ ton, Model 7AJ, weighs 7½ lb, has a low clearance height of 7 in. and a maximum lift of 14 in., including a screw extension adjustment of 2 in. The hydraulic lift of this model is 5 in. high. The base is 3½ in. by 5½ in., and the handle is 13¼ in. long.

Model 349, three-ton capacity, weighs 16 lb, has a low clearance of 9 in. and a maximum lift of 18 in. The screw extension adjustment is 2½ in. Hydraulic lift is 6½ in. high, with a base, 4 in. by 6½ in. The unit has a control handle 18 in. long.

The five-ton, Model 549, weighs 18 lb and has a low clearance of 9 in. and a maximum lift of 18½ in. The hydraulic lift height and handle length are the same as the three-ton model. Base size is 4¼ in. by 6¾ in. *St. Anthony Machine Products Co.*

Circle P-6 on page 65 for more data



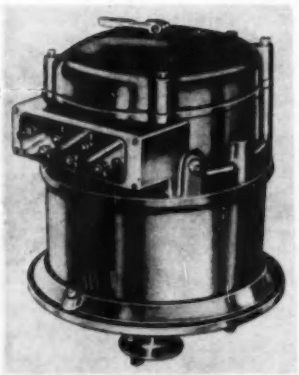
Four-Ply Asbestos-Wrapped Muffler

Now available is a four-ply asbestos-wrapped muffler, designed especially for high compression engines. It has three steel plys spun together and permanently interlocked with the end caps. Thus, the asbestos wrapping, laid between sheets of metal, is fully enclosed to give positive protection.

Other features of the muffler include: a cushion chamber to prevent the exhaust from resounding against end caps; extra heavy steel end caps; internal twin-tube construction with two twin halves welded into a single twin-tube unit; and spun heads which interlock heads and body edges for a tight mechanical gas seal.

The muffler is said to have been specifically designed to reduce exhaust gas noise and to eliminate radiation of muffler heat to the body of the car. All steel plys are spun as an integral unit into end caps. *Maremont Automotive Products, Inc.*

Circle P-7 on page 65 for more data



Ignition System for Natural Gas Engines

Recently announced is an ignition system for natural gas engines which incorporates a pulse generator known as type MGC. It is approximately 11¼ in. in diameter and stands about 12½ in. above its mounting.

The generator is said to supply accurately timed low-tension electrical pulses, which are stepped up to the required spark potential by means of either CLQ single or CLP double-spark ignition transformers mounted on each cylinder near the spark plug or plugs. They are hermetically sealed, oil filled, and have closed cores.

The manufacturer states that no breakers are in operation during running, and no distributor is employed. Breakers are used for starting only and are automatically retracted mechanically during normal engine operation.

The magnet rotor is a built-up assembly consisting of a single large Alnico V magnet with laminated pole shoes. It is provided with a 16-tooth 20/40 pitch external involute spline at the drive end and a single dwell hardened steel cam at the breaker end.

(*Turn to page 98, please*)

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

USE THIS POSTCARD

FREE LITERATURE

Combustion Engineering

"Heat In Harness" is the title of a 40-page booklet which covers combustion engineering development over many years in numerous industries. *Surface Combustion Corp.*

Circle L-1 on postcard for free copy

Sprockets

Now available is a 12-page brochure describing the Grip-Master sprocket series. Complete specifications and other data are given. *Cullman Wheel Co.*

Circle L-2 on postcard for free copy

Compressors

Bulletin No. 118 describes an extensive line of balanced/opposed motor driven compressors. Full specification data are included. *Clark Bros. Co.*

Circle L-3 on postcard for free copy

Casters and Trucks

Catalog No. CT-52 describes the Rapistan line of casters and trucks. Specifications and other data are furnished. *The Rapids-Standard Co.*

Circle L-4 on postcard for free copy

Versatile Lubricant

Now available is a booklet on Molysulfide lubricant. Its numerous applications are fully covered. *Climax Molybdenum Co.*

Circle L-5 on postcard for free copy

Aluminum Progress

A brochure (No. AD-250) currently available contains a review of aluminum's progress in the metals field and outlines the manufacturer's research and development facilities. *Aluminum Co. of America.*

Circle L-6 on postcard for free copy

Conveyor Systems

Catalog No. 852 describes a full line of gravity and power conveyors and special conveying machinery. *Matthews Conveyor Co.*

Circle L-7 on postcard for free copy

Machine Oils

Available for distribution is a brochure on Sunvis H.D. 700 oils. Lubricating qualities and applications are analyzed. *Sun Oil Co.*

Circle L-8 on postcard for free copy

Hard Facing Alloys

Catalog No. 77, covering a line of hard facing alloys, is now available. *Wall Colmonoy Corp.*

Circle L-9 on postcard for free copy

Steels

Now available is an indexed handbook on Desegatized high-speed, tool, and die steels. Requests for copies should be made on business letterheads. *Latrobe Steel Co., Latrobe, Pa.*

(Please turn page)

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L-1	L-7	L-13	L-19	E-1	E-7	E-13	E-19	P-1	P-7	P-13	P-19	P-25
L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
L-6	L-12	L-18	L-24	E-6	E-12	E-18	E-24	P-6	P-12	P-18	P-24	P-30

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Automotive Bearings

Recently made available for distribution to engine rebuilders is a 100-page illustrated manual on the correct method of removing, installing, and maintaining automotive bearings. Requests for copies must be made on business letterheads. *Johnson Bronze Co., 317 S. Mill St., New Castle, Pa.*

Power Steering

Now available is a brochure on the Air-O-Matic Power Steer Booster which describes the utilization of compressed air to bring lower-cost, safer, easier steering to owners and operators of commercial and heavy duty vehicles. *Air-O-Matic Power Steer Corp.*

Circle L-10 on postcard for free copy

Rivet Line

Now available is a booklet entitled "Riveting with Hi-Shears" which describes these rivets and how they are used. *The Hi-Shear Rivet Tool Co.*

Circle L-11 on postcard for free copy

Precision Grinders

Catalog No. CG-53 describes and illustrates a line of precision grinding machines. *Landis Tool Co.*

Circle L-12 on postcard for free copy

Heat-Treating Equipment

Catalog No. 52 features a line of heat-treating equipment. Installation views are shown. *The Pressed Steel Co.*

Circle L-13 on postcard for free copy

USE THIS POSTCARD

Ground Flat Stock

Bulletin No. 52-803 gives data on ground flat stock, an oil hardening tool steel. Various widths and thicknesses are listed. *The DoALL Co.*

Circle L-14 on postcard for free copy

Industrial Tapes

Recently released is a folder containing selector sheets for Polyken industrial adhesive tapes. *Bauer & Black Div., The Kendall Co.*

Circle L-15 on postcard for free copy

Machine Tools

A 1953 machine tool catalog (Publication No. M-1776) now available has been up-dated to include a line of Hydroform machines and precision grinding wheels. *The Cincinnati Milling Machine Co.*

Circle L-16 on postcard for free copy

Research and Production

A booklet now being offered describes the manufacturer's facilities for handling any type of engineering, design, or production problem. *Lycoming-Spencer Div., Avco Manufacturing Corp.*

Circle L-17 on postcard for free copy

Aviation Review

"A Chronicle of the Aviation Industry in America—1951 Supplement," the fifth in a series of booklets, is now available. Important aeronautical events and contributions of U. S. manufacturers to the industry are covered. *Eaton Manufacturing Co.*

Circle L-18 on postcard for free copy

Rubber Bonding

Recently published is a rubber-to-metal bonding supplement to Catalog No. 51. The process is explained under sections entitled applications, procedures, design, compounding, processes, and bond strength ratings. *Acushnet Process Co.*

Circle L-19 on postcard for free copy

Truck Batteries

Recently released is a brochure on "Thirty" and Kathanode batteries with "Z" plates for use with electrical industrial trucks. Engineering specifications are included. *Gould-National Batteries, Inc.*

Circle L-20 on postcard for free copy

Control Systems

Now available is a 12-page manual on push-pull control systems. The booklet covers construction, installation, design, and layout. *Simmonds Aerocessories, Inc.*

Circle L-21 on postcard for free copy

Precision Lathes

Catalog No. 5205 covers a line of precision lathes with data and illustrations. *South Bend Lathe Works.*

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(*See preceding page*)

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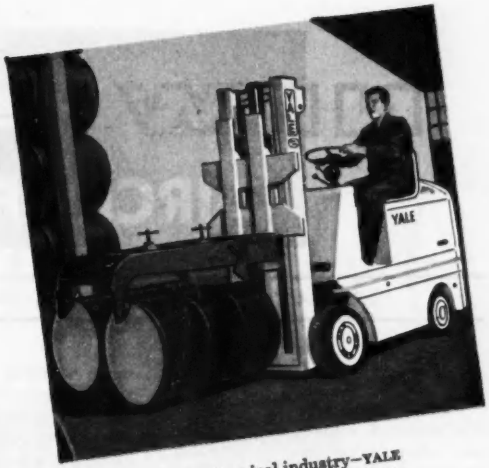
FREE LITERATURE				NEW PRODUCTS & PLANT EQUIPMENT				NEW PRODUCTS			
L-1	L-7	L-13	L-19	E-1	E-7	E-13	E-19	P-1	P-7	P-13	P-19	P-25
L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
L-6	L-12	L-18	L-24	E-6	E-12	E-18	E-24	P-6	P-12	P-18	P-24	P-30

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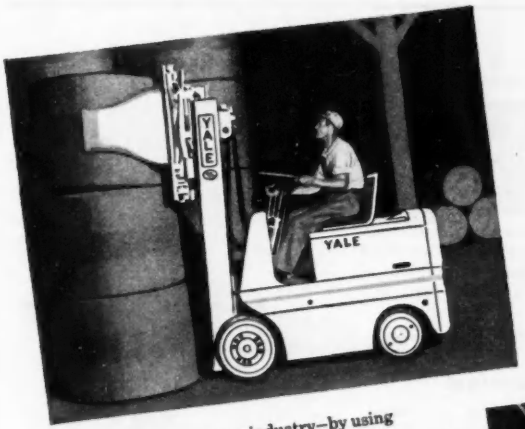
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Address ..... (No. & Street) (City) (Zone) (State)

Isn't it time Your business enjoyed these savings, too?



SAVINGS to the chemical industry—YALE Gas Trucks move drums and carboys gently, smoothly, safely. They speed handling, reduce breakage, prevent accidents.



SAVINGS to the paper industry—by using YALE Gas Trucks to handle bulky paper rolls, users are able to free more of their manpower for productive assignments.



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Exclusive YALE Gas Truck Features Cut Materials Handling Costs . . . and Maintenance Costs, too

• Time lost in bringing YALE Gas Truck Savings to your business is *money* lost. For YALE Gas Trucks can cut up to 75% off your materials handling costs . . . save even more in reduced maintenance costs and production stoppages.

Find out now how YALE Gas Trucks' exclusive features reduce your bills for breakdown and wear in transmission, drive, steering assembly—every working part of the truck. Call your YALE Representative—or mail the coupon today.

YALE is a registered trade mark of The Yale & Towne Manufacturing Co.

YALE & TOWNE **MAIL THIS COUPON TODAY**

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How can YALE Industrial Gas Trucks do more—save more—for me?
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In Canada write: The Yale & Towne Manufacturing Company
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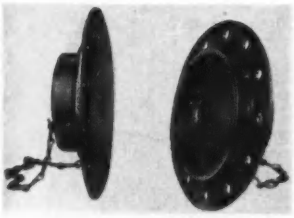
YALE GAS AND ELECTRIC INDUSTRIAL TRUCKS • YALE WORKSAVERS • YALE HAND TRUCKS • YALE HAND AND ELECTRIC HOISTS • YALE PUL-LIFTS

NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Fuel Cap and Adapter

Now on the market is CM-2432 fuel filler cap and adapter assembly. The cap, which meets test specifications of MIL-C-7244, features a safety "pop-up" action and quick-sealing engagement.



Eaton fuel cap and adapter.

The adapter reportedly can be easily shaped to conform with various tank contours. Its shallow construction is said to make it particularly adaptable when high nesting ratios are required. *Stamping Div., Eaton Manufacturing Co.*

Circle P-1 on page 65 for more data

Hermetically Sealed Relay

Designed especially for airborne electronic equipment, a hermetically sealed relay that meets joint Air Force and Navy Spec. ANE-19, is in production. Compact, small and light in weight, it is said to be particularly adaptable for applications wherever miniaturization is a factor.

The relay is hermetically sealed to withstand pressures without leakage up to 85,000 ft. It is available with silicone glass insulation.

The relay is claimed to withstand 10 g's vibration with a minimum available power of 500 milliwatts. Coil resistances are available up to 16,000 ohms. Relays are available either in single pole—double throw or double pole—double throw with contact material either pure silver rated at 1½ amp or palladium rated at three amp. *Advance Electric and Relay Co.*



Advance hermetically sealed relay.

Circle P-2 on page 65 for more data

Solderless Terminal

Recently marketed is the Ampli-Bond solderless terminal that is said to have been developed especially for intricate control panel wiring.

It is claimed that no underlying conducting surface will be exposed even if the insulating sheath is pierced. This is accomplished by means of an insulated metal ring near the base of the insulation support sleeve. The ring reportedly gives all necessary strength to combat vibration and sharp bending.

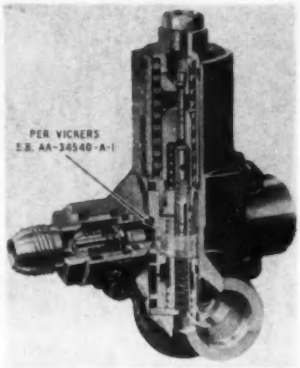


Aircraft-Marine terminal.

The terminal is now available in the 12-10 and 16-14 hd sizes but are expected to be available in smaller wire sizes shortly. *Aircraft-Marine Products, Inc.*

Circle P-3 on page 65 for more data

Pressure Regulator



The redesigned Vickers AA-34500-A series 3000-psi hydraulic pressure regulator is said to be a reliable, 6000-hr overhaul, low-cost service accessory. Already in use on many commercial and military aircraft, it has most recently been specified for use on the Convair 340. The valve design is provided with a protective screen, has a built-in accumulator line check valve, and internal operating parts have been simplified. (Vickers, Inc.)

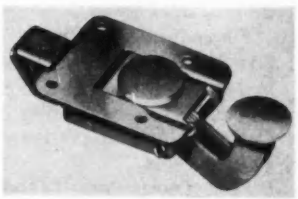
Circle P-4 on page 65 for more data

Push-Button Latch

Designated part No. H-4100, a latch is designed for aircraft, marine, and other applications.

Only exposed parts are the recessed, flush, circular trigger button and close button. Finger-tip pressure opens the latch. *Hartwell Aviation Supply Co.*

Circle P-5 on page 65 for more data



Hartwell push-button latch.

Acceptance

Speaking of Chrome . . .

Sealed Power

Chrome-Faced

Piston Rings

are used

as original equipment by

23 (*yes, twenty-three*)

leading

engine manufacturers

Sealed Power Piston Rings

SEALED POWER CORPORATION • MUSKEGON, MICHIGAN

Sole manufacturers of KromeX Ring Sets, MD-50 Steel Oil Ring, Full-Flow Spring, Flex-S Flexible Oil Ring, and GI-60 Groove Inserts. Leading producer of Automatic Transmission Rings and Non-Spin Oil Rings.

The BUSINESS PULSE

Production, Income, and Employment Continue to Show Gains While Steel Output Has Been Pushed Beyond Theoretical Capacity. There Have Been No Upward Price Tendencies Despite Improved Conditions.

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

Business Continues to Quicken

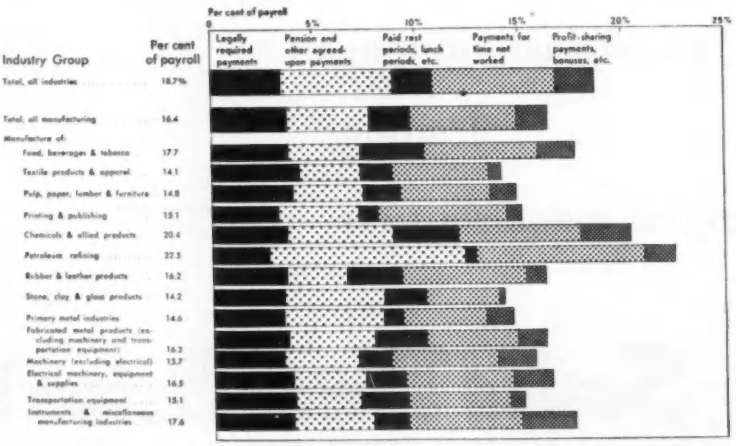
The tempo of general business has continued to quicken in recent weeks, and the outlook for sustained high-level operations throughout the remainder of the year is generally considered excellent. Gains in production, income and employment reflect the usual autumn pickup, as well as continuing efforts on the part of durable-goods manufacturers to make up for output losses suffered during the steel dispute. Greater use of instalment credit by consumers, together with a gradually rising propensity to spend from current income, has also brought improvement in retail trade, and many merchants expect that sales in the coming Christmas season will rise to record or near-record levels. Harvesting of the nation's major crops is now virtually completed, and expectations are that total farm output this year will establish a new record. This belief, coupled with seasonal abundance, has caused a weakening of farm prices in the recent past. Prices of nonfarm products at retail have shown little variation lately, but quotations on a number of basic commodities at wholesale are continuing to drift lower.

Durable-goods industries, as noted above, are striving to recoup earlier output losses. Steel production itself has been pushed several percentage points above theoretical capacity, and it is believed that this peak rate will be maintained throughout the remainder of the fourth quarter in view of the heavy backlog of unfilled orders. Indeed, at a recent press conference, Benjamin F. Fairless stated that United States Steel expected to continue "full operations" through the first quarter of 1953.

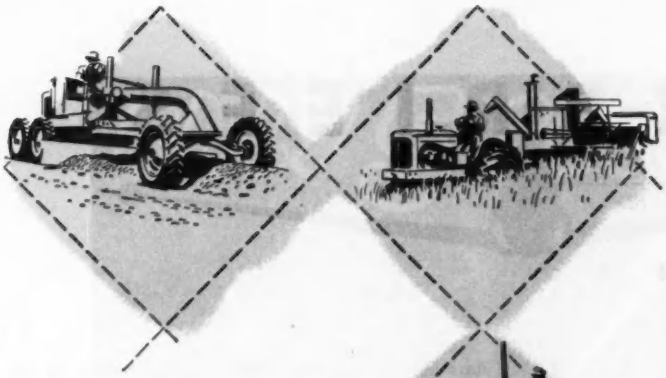
Automobile producers have been scheduling overtime and second-shift operations, and as a result output rates in recent weeks have exceeded those in the pre-strike period, despite the fact that manufacturers are now making preparations for the shift to production of 1953 models. September shipments of machine tools were the highest for any month of the last decade, while furniture shipments were larger than in any other month since April, 1951.

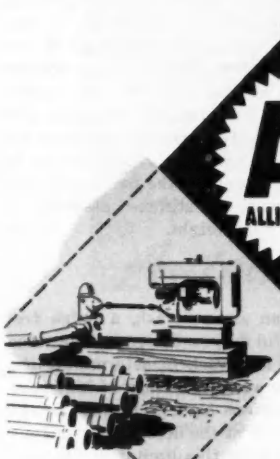
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FRINGE PAYMENTS HIDDEN IN PAYROLLS DURING 1951



Source: Chamber of Commerce of the United States.





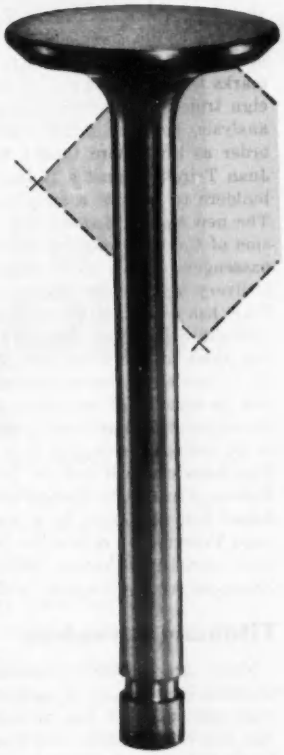
A-C
ALLIS-CHALMERS

another famous name that relies on THOMPSON VALVES

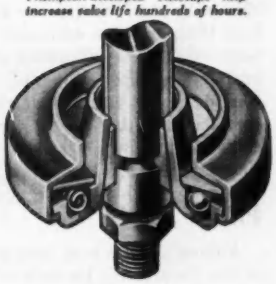
ALLIS-CHALMERS engines for farm machinery, construction equipment, and industrial jobs all depend on Thompson Valves to maintain maximum power for longer periods of time.

Thompson engineers work with Allis-Chalmers to develop valves to meet the many varied types of service that Allis-Chalmers equipment faces around the world.

Take a tip from Allis-Chalmers and other leading engine builders...count on Thompson for engineering leadership.



Thompson-developed "Rotocaps" help increase valve life hundreds of hours.



VALVE DIVISION

Thompson Products, Inc.

CLEVELAND 17, OHIO

AIR BRIEFS

By ROBERT McLARREN

The Dam Breaks

Pan American World Airways action in ordering three de Havilland Comet jet transports last month has broken the dam against U. S. airline acceptance of jet transport equipment but, more importantly, marks the first time a U. S. airline has bought a foreign transport airplane in a quarter-century. Careful analysis, however, points strongly towards the small order as little more than a hedge by PAA president Juan Trippe against a failure of the U. S. transport builders to provide a suitable jet transport by 1956. The new Comet Model 3 is a larger and heavier version of the four-jet liner with a luxury capacity of 58 passengers and a coach capacity of 78 passengers. Delivery is not scheduled until the end of 1956 and PAA has an option on seven additional airplanes for 1957 delivery. Observers believe that Trippe is using the order as the most powerful possible stimulus to U. S. builders to have their models ready for production in advance of his option date. This order is not the signal that has been long awaited for the deluge of jet transport orders by U. S. domestic airlines, since Pan American will use the Comets on its New York-Buenos Aires run. Trippe may have been partially forced into the order by a similar order from Linea Aero Venezuela, a competitor in South America which has ordered two Comets. It will be recalled that Pan American has no domestic airline routes in the U. S.

Titanium Turnabout

There are current indications that the supply of titanium has not only miraculously caught up with aircraft demands but has already well exceeded them. The Air Force admits that there is now a surplus of about 100 tons of titanium available and explains it this way: the industry has gotten so used to the idea that titanium is in extremely short supply that it has been overly reticent about specifying its use in aircraft. Titanium production is currently about four tons daily but this output will be increased to eight tons daily by the first of next year. Meanwhile, only three manufacturers are using it in regular production and then use only a few pounds on each airplane.

Filled Parts

Although it has been long predicted that the aircraft of the future will be built of solid materials, a long start already has been made in that direction by the growing use of foamed plastic as a filler material for aircraft parts. Lockheed and Northrop aircraft companies have found that filling such parts as trim tabs, ailerons, rudders, elevators and radomes with foamed plastic gives them increased stiffness and, therefore, greater resistance to vibration. The beauty of the plastics (Lockheed uses "Lockfoam," made up of isocyanates and resinous ploymers; Northrop uses "Styrofoam," a polystyrene) is that they may be simply poured into an existing trim tab, for example, and allowed to harden. They are thermosetting plastics, and a chemical reaction causes carbon dioxide to bubble inside the material and fill the part with tiny, insulated pores. The result is a stiffened assembly at only a minute increase in its weight.

Liability Limits

As an aftermath of an airline crash, a judge frequently has the distasteful duty to determine the value of a human life lost in the crash in determining the amount of damages to be awarded to next-of-kin. Customarily these determinations have been made on the basis of the probable worth of the deceased during his normal life expectancy. Even this limitation has permitted the payment of very large sums in damages. To answer this problem, the International Civil Aviation Organization has established damage liability limits for current aircraft on the basis of their weight, i.e., $36,850 for aircraft weighing 2200 lb or less; $773,000 for aircraft weighing 110,000 lb or less. These odd figures result from the determination of liability in French gold francs valued as of 1928 and airplane weight in kilograms. For the first time in court history, liability in respect to loss of life shall not exceed $36,850 per person. While apparently calloused, this determination has long been needed to prevent airlines from suffering lawsuits ranging well into the multi-millions following a serious crash.

Material Controls Fading

Washington observers are confidently predicting that the Controlled Materials Plan will be washed up during the first quarter of next year. They even say that the Plan would have been abandoned by now had not the steel strike forced its continuation. Demise of

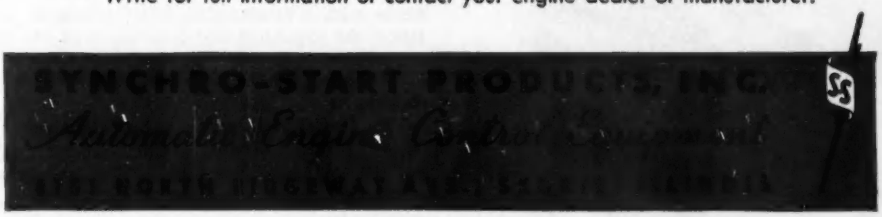
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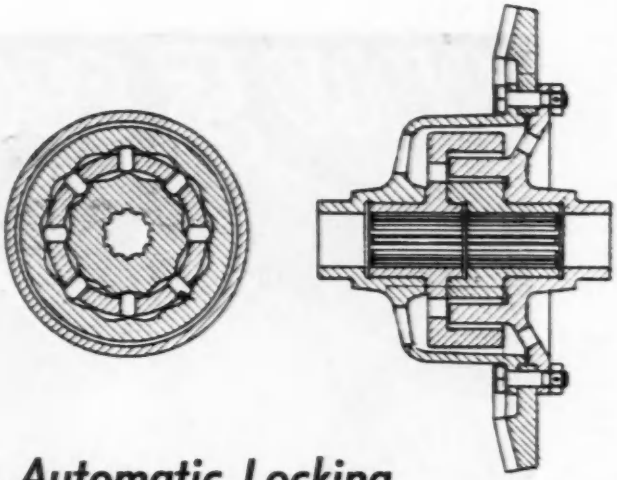
Power failure can be a costly inconvenience in dollars, and even lives. The instant the main power fails, a SYNCHRO-START equipped standby generator set will go to work and get the generator on the line to provide emergency power. With most small engines, the plant will be on the line producing emergency power in five seconds or less—larger engines in proportion.

The proper SYNCHRO-START automatic controls can be furnished for any model of internal combustion engine. In addition to power failure starting, they are used for fire protection, water and sewerage pumping, underpass pumping, mine ventilation, industrial processing, refrigeration, television, telephone, radio, etc.

Write for full information or contact your engine dealer or manufacturer.



Longitudinal and transverse sectional views of the Z-F automatic locking differential. Note that each driven member is splined for attachment to an axle shaft.



Z-F Differential

Features Automatic Locking

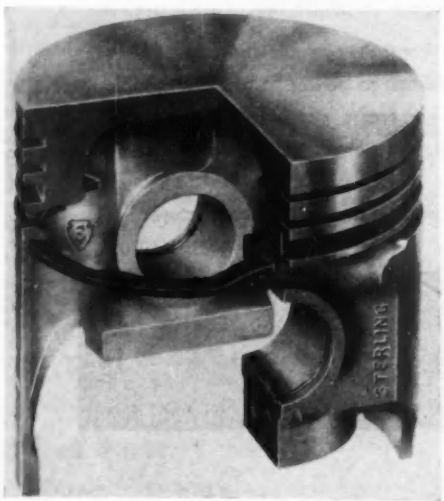
FITTED to a certain number of European automobiles, and particularly the Ferrari racing cars, the Z-F differential, manufactured by Zahnradfabrik, of Friedrichshafen, Germany, is of the automatic locking type. The locking action is obtained by the wedging of the driving member between the two curviform faces of the driven member. One of the differential shafts is splined to the interior curved track and the other to the external curved track. The ring gear transmits force through a series of bar-cams, as shown in the illustration.

Automatic locking of the Z-F differential prevents rotation of the wheel which has lost adherence at a speed greater than that of the opposite wheel. To assure automatic locking, it is necessary that the resistance of the slipping wheel does not fall below a certain value. If the friction coefficient is too low, the wheel will spin. By applying the brakes to both rear wheels it is possible to facilitate automatic locking.

Among the advantages claimed for the Z-F are: the possibility of starting away when one of the wheels has poor adherence; less wheel spin; reduced tire wear.

• • •

Part-cutaway view of new Sterling Conformatic piston.

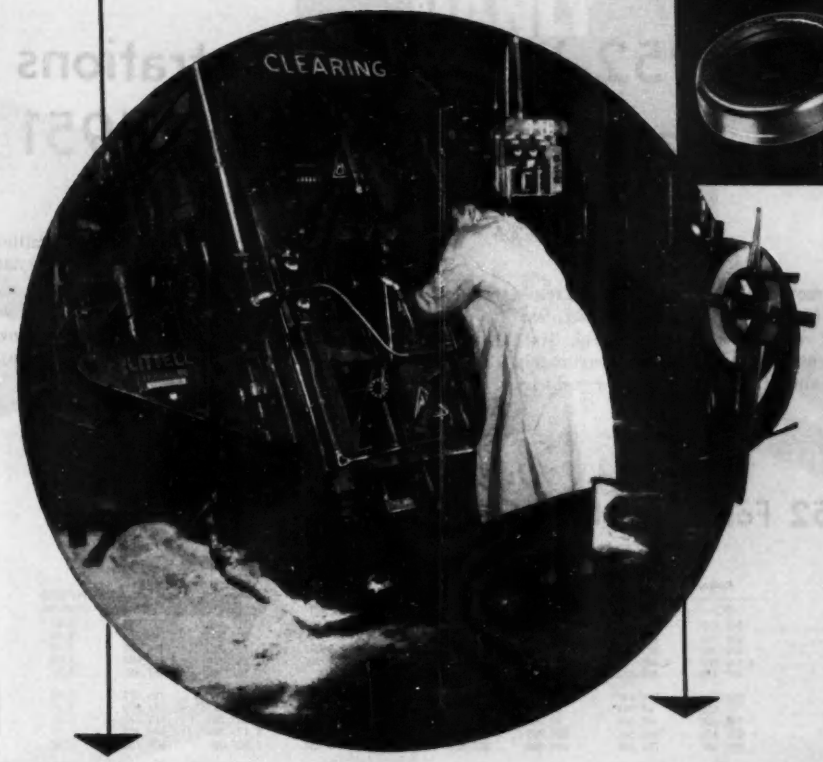


New Piston Holds Clearance at All Operating Temperatures

A NEW aluminum piston with a skirt that conforms snugly to the cylinder wall and holds a close clearance, either hot or cold, has been announced by Sterling Aluminum Products, Inc. The Conformatic, as this new piston with a "conforming skirt" is named, is said to follow the expansion and contraction of the cast iron engine block so exactly that it can be fitted to clearances of less than 0.001 in. without any danger of scuffing or slapping.

This Conformatic action is brought about by a reversal of strain between a thin, circular steel insert and the aluminum alloy piston skirt. The steel insert, of variable cantilever design, is cast against the inside of the piston skirt. As the piston cools and contracts, the steel insert is put under compression. During the

(*Turn to page 90, please*)



BEARING DOWN ON PRODUCTION

This Clearing press at Aetna Ball Bearing & Roller Co. is equipped with automatic feed and combination die so that every press stroke delivers a completed piece. Production on this basis brings costs right down to bedrock.

Just as important as speed of production is the *precision* with which the press operates. That's a big reason why Aetna chose the Clearing for this spot. Accurate, uniform output at top speed results in a really quality product without getting unreasonable costs.

Clearing presses can improve your production picture, too. Why don't you get in touch with us? It won't cost you anything to find out the facts.

CLEARING MACHINE CORPORATION
6499 WEST 65TH STREET ★ CHICAGO 38, ILLINOIS
HAMILTON DIVISION, HAMILTON, OHIO

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

By Marcus Ainsworth

1952 Vehicle Registrations Up 2.6 Per Cent Over 1951

OVER 52 million motor vehicles will have been registered by the end of the 1952 registration year. Unregistered vehicles owned by Federal, State and Local Governments will account for approximately 630,000 units, bringing the total of motor vehicles which have been in use during 1952 close to 53 million.

Actual 1952 registrations will approximate 52,336,142 as compared with 50,991,616 during 1951, a gain of about 2.64 per cent. Of these totals 43,249,362 will be passenger cars, an increase of 2.64 per cent over 42,136,297 registered during 1951. Trucks and buses

(*Turn to page* 110, *please*)

1952 Forecast of Motor Vehicle Registrations

As of the End of the 1952 Registration Year

STATE	Passenger Cars*		Trucks		Buses		Total Motor Vehicles		Per Cent Increase
	1952	1951	1952	1951	1952	1951	1952	1951	
Alabama	542,650	507,233	167,000	162,056	1,700	1,907	711,550	671,996	6.03
Arizona	239,190	221,450	69,760	64,564	750	716	309,700	286,750	8.00
Arkansas	328,000	327,916	154,000	153,149	3,700	3,637	485,700	484,702	0.21
California	4,145,000	4,029,765	700,000^	643,926	7,250	7,206	4,852,250	4,679,899	3.68
Colorado	467,918	459,326	129,282	126,325	‡	‡	597,180	587,651	1.62
Connecticut	665,510	623,637	93,615	89,172	3,228	2,772	762,362	720,581	5.80
Delaware	91,500	87,500	22,000	20,980	†	†	113,500	108,822	4.24
Dist. of Columbia	165,200	161,065	16,500	18,602	2,250	2,008	185,900	181,675	2.32
Florida	972,921	905,502	931,883	187,219	6,500	6,418	1,173,284	1,099,139	6.74
Georgia	805,000	751,349	216,000	203,825	6,000	3,534	1,027,000	968,708	7.12
Idaho	202,000	200,490	75,000	75,484	†	162	277,000	276,136	0.31
Illinois	2,450,000	2,402,673	360,000	378,068	3,000	†	2,813,000	2,781,741	1.12
Indiana	1,265,000	1,236,471	230,500	247,965	9,000	8,825	1,510,400	1,493,261	1.15
Iowa	880,000	883,759	183,000	180,107	†	†	1,063,000	1,063,866	−0.08
Kansas	691,172	677,939	226,493	215,087	†	†	917,665	893,038	2.76
Kentucky	629,000	635,024	169,900	171,445	3,000	2,981	863,500	809,430	6.69
Louisiana	581,128	569,733	164,856	161,428	3,906	3,856	749,633	735,015	2.00
Maine	213,075	208,134	64,200	63,353	375	467	277,650	271,954	2.09
Maryland	659,912	619,409	111,137	106,573	4,899	4,411	775,947	730,093	6.19
Massachusetts	1,190,000	1 162,934	169,000	169,643	7,920	6,193	1,366,920	1,337,770	2.18
Michigan	2,223,900	2,214,294	312,000	311,948	†	†	2,535,900	2,526,232	0.38
Minnesota	996,900	1,000,724	299,000	302,536	3,665	3,438	1,299,585	1,306,696	0.24
Mississippi	358,050	345,960	159,724	154,323	2,500	2,496	520,283	502,779	3.48
Missouri	1,040,000	1,035,461	272,000	270,150	4,500	4,550	1,316,500	1,310,151	0.48
Montana	190,000	188,967	87,000	84,282	†	†	277,000	271,209	2.13
Nebraska	500,000	467,961	140,000	139,431	875	888	640,875	607,270	5.53
Nevada	67,000	64,057	21,000	19,782	‡	‡	88,000	83,810	5.21
New Hampshire	143,000	142,190	34,000	33,511	‡	‡	177,000	175,700	1.68
New Jersey	1,498,905	1,441,013	213,900	213,853	9,710	10,050	1,722,515	1,664,916	3.46
New Mexico	191,899	173,433	69,847	59,349	1,210	899	262,956	233,681	12.53
New York	3,374,000	3,317,186	465,000	450,661	17,000	11,386	3,856,000	3,767,233	1.81
North Carolina	921,000	899,373	218,500	208,465	9,300	8,211	1,147,800	1,107,049	3.66
North Dakota	195,000	194,428	93,000	86,480	195	186	288,195	281,094	2.53
Ohio	2,610,000	2,555,025	380,000	352,441	9,160	9,010	2,975,160	2,912,476	2.15
Oklahoma	657,190	641,256	220,000	211,365	1,250	1,681	878,350	854,304	2.81
Oregon	624,885	616,417	85,634	82,941	1,500	1,944	711,199	702,282	1.28
Pennsylvania	2,744,294	2,700,386	510,000	502,295	12,900	12,700	3,267,194	3,215,341	1.61
Rhode Island	234,330	227,753	32,615	32,096	580	763	267,525	260,572	2.67
South Carolina	527,000	481,367	124,000	116,963	4,900	4,778	655,900	603,118	8.75
South Dakota	219,226	219,354	77,722	75,080	291	319	297,233	294,753	0.84
Tennessee	705,000	702,426	194,000	182,753	2,400	2,386	901,400	887,564	0.43
Texas	2,500,000	2,453,190	672,000	659,999	5,391	5,212	3,177,391	3,118,361	1.89
Utah	216,000	210,949	49,979	48,807	525	616	266,503	260,363	2.40
Vermont	110,400	106,382	15,400	14,941	157	157	125,957	121,480	3.68
Virginia	850,895	804,916	190,450	186,383	2,225	2,032	1,043,460	1,003,931	3.94
Washington	792,200	782,742	170,000	163,772	1,900	1,754	964,000	948,268	1.66
West Virginia	376,400	370,817	115,000	110,160	1,400	1,388	492,800	482,363	2.16
Wisconsin	1,023,000	1,000,066	240,000	238,277	2,700	2,737	1,270,700	1,231,080	3.22
Wyoming	109,000	104,505	46,000	41,310	‡	‡	155,000	145,824	6.29
Total	43,249,362	42,136,297	8,931,253	8,714,170	185,929	141,149	52,336,142	50,991,616	2.64

†—Included with trucks. ‡Included with passenger cars. *—Includes taxicabs.
^—Includes approximately 130,000 light trucks registered as passenger cars.

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is faster!



... for Piercing

for Punch Extruding...

... for Trimming

for Riveting...

You can pierce, trim, extrude or rivet at less cost because you can do it faster with Danly Hydraulic Metalworking Equipment! Check these new cost and time saving advantages:

• ***Greater Capacity*** . . . the exclusive Danly hydraulic system minimizes break-through shock and permits smoother operation at higher pressures. You can pierce holes smaller in diameter than the thickness of your steel!

• ***Automatic Stripping Action*** . . . set-up and operation are greatly simplified because blank-holding and stripping action is an integral part of the Danly power cylinder cycle . . . completely hydraulic.

• ***Less Down Time*** . . . hardened and ground wear surfaces and extra long guides assure maximum tool life. Springs and rubber cushions, a major cause of failure, are eliminated.

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By
James A. Leake
Plant Manager
The Leake Stamping Co.

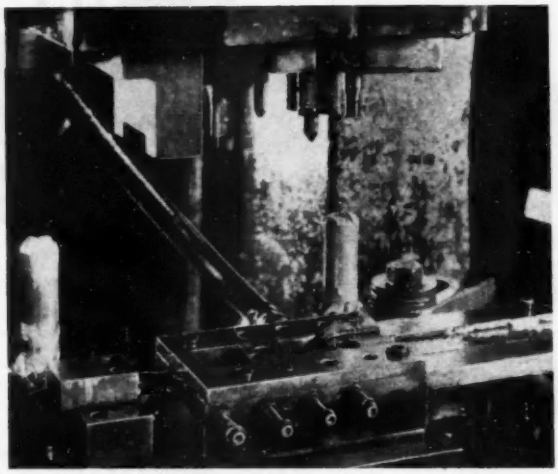


Fig. 1—Five-station progressive die designed and used for production of door latch rotors from ¼-in. thick steel strip that is hand fed. Parts are held within close dimensional limits.

Door Latch Rotor

Now STAMPED Successfully

For several years, the star shaped rotary latch, widely used on passenger car doors, was produced as a die casting, although it is of a shape readily sheared from steel. The die casting served its purpose well, but recently the customer decided to investigate the stamping possibilities and contacted the Leake Stamping Co., Monroe, Mich., which came up with a satisfactory and economical product despite the close tolerances demanded.

This rotor is sheared from ¼-in. mild steel strip and then shaved on its outer contour to specified shape, dimensions and finish. As for many other stampings, the economic answer lay in using a die that is not only fast in operation but capable of precise work. The die being of the progressive type, piece handling is minimized and a finished stamping is produced in each working stroke, except when starting a new strip.

Figure 1 shows the die set up in a 5A Toledo press. Stock is 1⅜ in. wide and is fed by hand. At each of four stations there is a spring stop that acts as a gage to position a new strip as it is fed in. After the lead end of the strip passes the fourth stop, all four stops become inoperative until the next new strip is started, as sheared blanks then control the feed following each working stroke.

Although the die has five stations, only four are used, the third one being left inoperative. At the third station, it was planned to size the hole with a shaving punch but, as the punch used to pierce the hole at the first station has proved capable of holding it within the 0.002-in. limits, no shaving punch is needed.

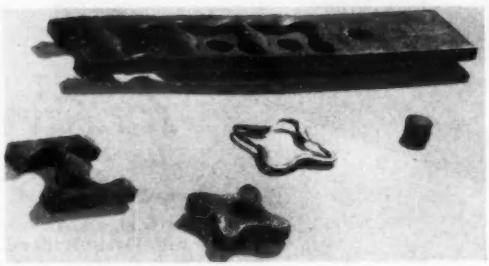
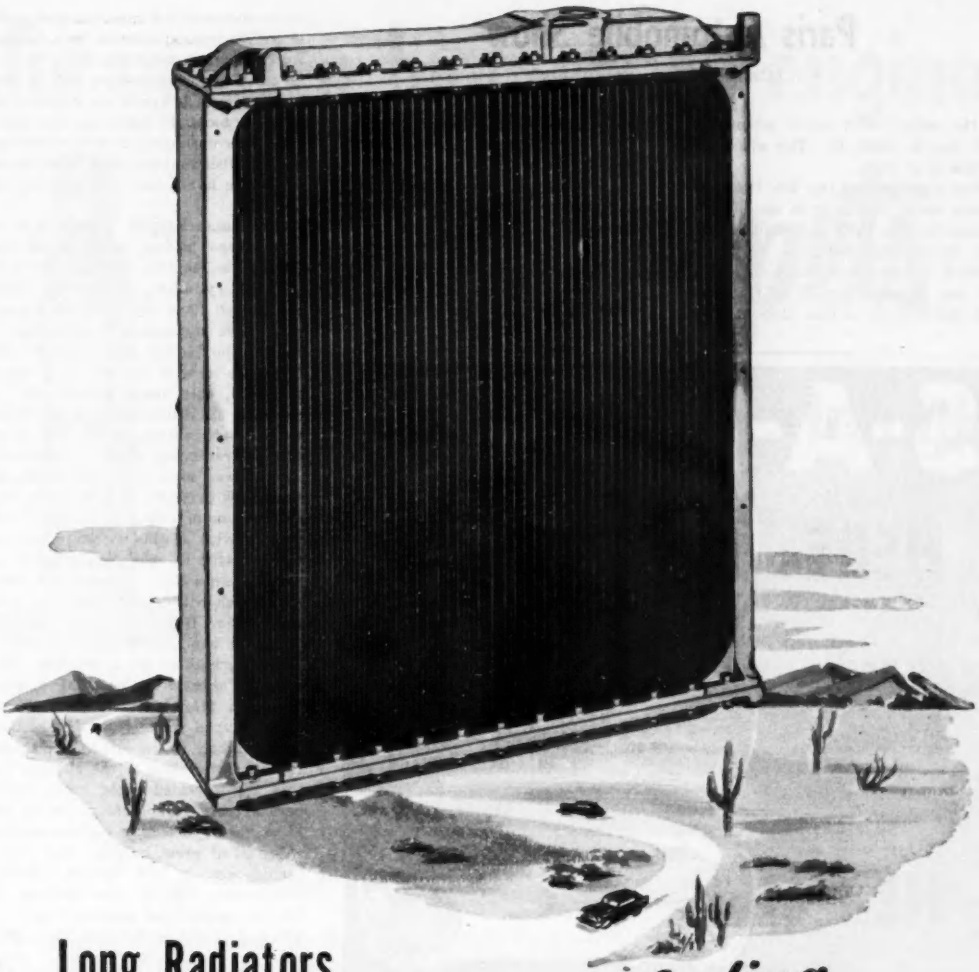


Fig. 2—A strip from the progressive die and (below the strip from right to left) a slug from the central hole, scrap shaved from the rotor stamping, a finished rotor and a section of scrap clipped from the skeleton.

In Fig. 2 is shown a progressive strip along with the slug from the hole, a shaving from the blank contour, a finished stamping and a piece of a skeleton, such as is clipped off at each working stroke of the die.

In the initial die position, the hole is pierced and, in the second position, a punch shears the rough contour but penetrates the stock only half way through, so that the blank remains in the hole and is advanced with the skeleton to the third and fourth stations. Shaving of the hole, planned for the third station, is found unnecessary, for reasons already explained, so the blank remains untouched at this blank station.

(*Turn to page 105, please*)



Long Radiators *for Balanced Cooling*

With nearly fifty years of specialization in radiator manufacturing, we offer the automotive manufacturer important advantages:

The widest possible range of sizes and capacities.

Engineering design and production skill that only long years of specialization can bring.

The background of countless applications of our concept of *balanced engine cooling.*

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ENGINEERING B-W PRODUCTION

LONG

CLUTCHES • RADIATORS • TORQUE CONVERTERS
OIL COOLERS

Paris Automobile Show

(*Continued from page* 45)

of the sedan, with spare wheel and tool kit, is 2535 lb. The electrical system is 12 volts.

Fiat also showed the V-8 124 mph sports model, which is in small scale production, the 1400, and the two versions of the small 500.

Much interest was shown in a special car designed by J. A. Gregoire and powered by a gas turbine built by the Societe de Constructions et d'Equipment Mechaniques pour l'Aviation. A description of the car and its unique power plant appears elsewhere in this issue of AUTOMOTIVE INDUSTRIES.

The National Spanish Co., of Barcelona, last year presented the high-performance, eight cylinder Pegaso, which was again shown this year, supplemented by a supercharged model with increased cylinder bore, bringing the piston displacement up to 171 cu in. Pegaso production still is low by reason of delays in the delivery of machine tools. If American manufacturers have completed their contracts, the English makers, who have large orders on hand, have not yet started delivery.

The supercharged Pegaso has a Roots type blower mounted on the top of the engine, between the two banks of cylinders, and driven at engine speed from the forward timing gear. The carburetor is immediately behind the blower and flexibly connected to it, with the air inlet under the cowl, this space being open or closed to the atmosphere by two flaps, with hand control. With the flaps open a ramming effect is obtained. The blower maintains the comparatively low pressure of 3.35 to 3.9 psi, and maximum output is 254 hp. Total weight with a closed two-passenger body is 4400 lb. The Spanish firm is working on a line of trucks and tractors which will be produced in a new factory now being erected at Madrid.

In the commercial vehicle section Berliet presented an under-floor Diesel bus chassis of unusual design. The main frame member consisted of a very large rectangular box-section tube, slightly to the left of the longitudinal center line of the chassis. To this were welded eight cross members of considerable height with, on the right-hand side, a narrow-section side rail of great height. The whole frame was in box section, welded throughout, and it was claimed to have an exceptional degree of rigidity. The body designed for this frame also was of unit construction, with stressed inner skin. The six cylinder Berliet Diesel of 580 cu in. was mounted centrally, with the heads projecting beyond the right-hand side rail, and combined a hydraulic coupling followed by a five-speed transmission and an offset hypoid rear axle. The radiator was mounted forward in the usual position, with both the fan and the water pump combined with it. Fan and water pump drive from the engine was by a triple-belt-driven propeller shaft. The air pump also was included in this layout, with the tank close by, outside the side rail. The Mill type screw and nut steering was power assisted. With a capacity of 55 seats, the coach was stated to weigh 19,000 lb with driver.

There has been a certain extension of under-floor engine mountings for buses, but Continental makers appeared to prefer the rear position, with the engine set transversely, fore



Only the Tung-Sol Signal Flasher provides this three-way warning for automotive uses—ahead—behind—and on the instrument panel. The important instrument panel pilot light tells the driver his signals are operating, or, by not flashing, warns him of a circuit failure.

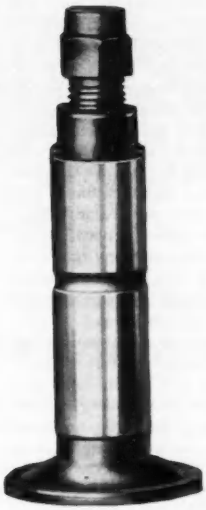
More than 13,000,000 Tung-Sol Signal Flashers have been used and they usually outlast the cars they're on.

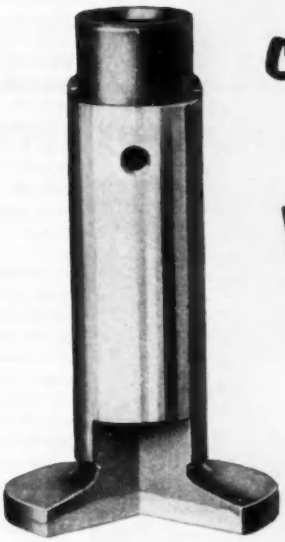
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All-Glass Sealed Beam Lamps, Miniature Lamps, Signal Flashers, Picture Tubes, Radio, TV and Special Purpose Electron Tubes.

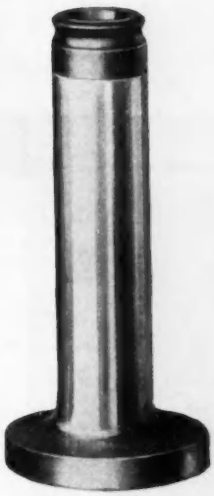
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Eaton Tappets





combine strength, light weight, wear resistance



The higher tappet loads in modern engines require extremely hard tappet faces and light weight bodies to insure proper functioning of the valve train. Eaton tappets combine these important advantages. A unique puddling method, perfected by Eaton over a period of years, produces exceedingly hard white iron tappet faces on steel bodies, providing high load-carrying capacity of face combined with desired lightness of the steel body. With this combination of superior strength, light weight, and wear-resistant face, these tappets meet the exacting requirements of today's and tomorrow's engines.

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No Structural Weakness

with

CAMCAR

COLD-FLOW

Machined | **Cold-Flow**



See the difference!

These two parts, one made by high production Camcar Cold-flow and the other by machining, were microphotographed to give visual proof of the strength and accuracy inherent in Camcar Cold-flow.

Notice the smooth structural lines of the Cold-flow part following the entire contour, including the threads. The metal flows where strength is required; machining cuts away the natural grain flow.

Order Camcar Cold-flow small metal parts for maximum tensile strength and close tolerances. You'll be convinced of the tremendous quality and production advantages on your first Camcar Cold-flow order. Send us parts or prints today.

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606 EIGHTEENTH AVENUE, ROCKFORD, ILLINOIS

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and aft, or flat. Isobloc, with an integral steel tube construction, placed the Hispano-Hercules Diesel flat at the rear, driving through a hydraulic coupling and a Wilson transmission. This construction makes the full width of the vehicle between the wheels available for baggage space. With a 49 passenger body, complete weight is 17,600 lb. Savia mounted the "six" Diesel transversely at the rear and the four longitudinally.

Chausson, with an all-steel frameless construction under Budd license, presented a variety of combinations, with a Hercules flat six or Panhard flat four engine, or with a vertical engine under a hood in the driver's cab. This company now is in production of a sectional bus shipped knocked-down, then assembled, upholstered and painted abroad.

Underfloor mounting for trucks appeared to be limited to two Renault models of five and seven tons load capacity. These had the engines immediately behind the cab and drive through a conventional transmission and an open drive shaft to a double-reduction axle. The distinctive feature is that the first reduction, by bevel pinions, is to the rear of the axle and then is brought forward to the spiral bevel ring gear. By removing the cover of the spur pinion housing it is possible to change the axle ratio very quickly without having to open up the axle housing.

The use of electric brakes for coaches and heavy trucks is extending. Another growing tendency is the use of single tires in place of duals, particularly on buses. Tire makers are largely responsible for this, but central underfloor engine mounting, with its more equal weight distribution, also has had its influence.

With a view to reducing cost of production, more makers are using the same bore and the same stroke for all models. Berliet has a four, five and six and Willeme a four, six and eight of equal dimensions. Hispano Suiza is now in full production on three Hercules types—a four, a vertical six, and a horizontal six. Mercedes presented a new 4 x 4 tractor of the Jeep type, powered by a 25 hp vertical Diesel and equipped with a six-speed transmission, coil springs all round and power take-off from a pulley mounted on a transverse shaft.

AUTOMOTIVE INDUSTRIES
Keeps You Informed

Production Pointers from GISHOLT

TIME-SAVING IDEAS



Presented as a service to machine shops, we hope some of these interesting ideas, culled from thousands of jobs, will suggest ways to help you cut time and costs in your own metal work.

COST-SAVING SETUP FOR MACHINING BOTH ENDS AT ONCE

Shows Value of Proper Tool Planning with Versatile Lathe

You can see real thinking has gone into this setup for machining tractor rear axle housings. As the result, this Simplimatic Automatic Lathe is simultaneously machining the two end flanges in a single, fast operation.

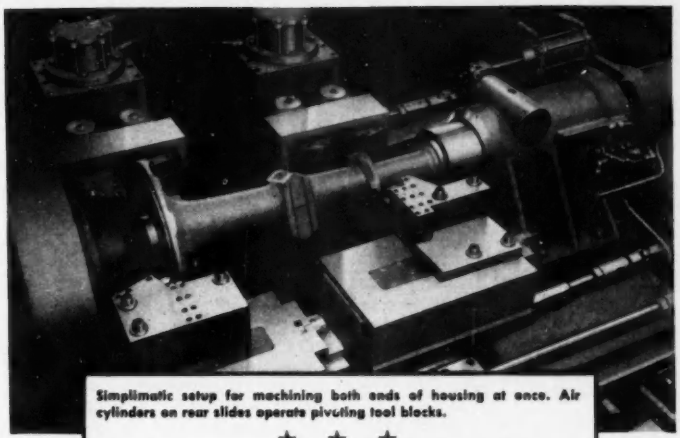
Work is divided between the four slides. All turning and some chamfering are done by the two front slides. The two rear slides take care of the straddle facing . . . doing it in an extremely clever way. Each of these rear slides consists of a pair of pivoted tool blocks which have a scissors-like action.

Tool Blocks have Two Sections

The two *right* rear tool blocks are tightly wedged together at the start of the cut. When straddle facing is completed they spring apart, providing tool relief for the withdrawal.

There's a different action to the two *left* rear tool blocks. Here, the tool blocks are partially wedged together as the slide feeds the tools into the work. As the slide continues to feed forward, the straddle facing tools are brought closer together. This splits the wide facing cut among three tools. At the completion of the cut, the tools spring apart for tool relief. Floor-to-floor time for the entire automatic operation is 1.33 minutes.

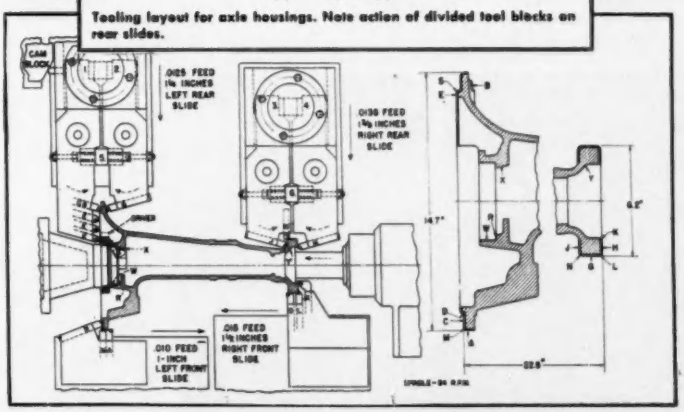
Pivoting tool blocks on this Simplimatic job provide the answer for machining both flanges in a single operation.



Simplimatic setup for machining both ends of housing at once. Air cylinders on rear slides operate pivoting tool blocks.

★ ★ ★

Tooling layout for axle housings. Note action of divided tool blocks on rear slides.



Other interesting jobs . . . handled on the Simplimatic Automatic Lathe, plus full information and specifications are yours in the all new Simplimatic catalog just off the press. Ask for your copy.

GISHOLT

TIME-SAVING IDEAS

AUTOMATIC LATHE TURNS OUT PARTS IN PAIRS

Tooling Arranged for Handling Related Parts with One Setup

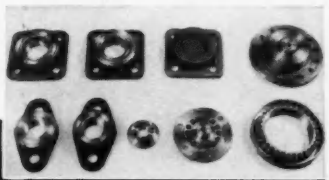
Here's a 1F Fastermatic Automatic Turret Lathe specializing in the production of a wide assortment of mating parts. The steel forgings are handled in lots of 200 pieces—100 male and 100 female parts.

Simple tooling takes care of the simple operations involved. Just two faces of the hexagon turret are needed for each part . . . but the handling of alternate male and female parts keeps four turret stations busy.

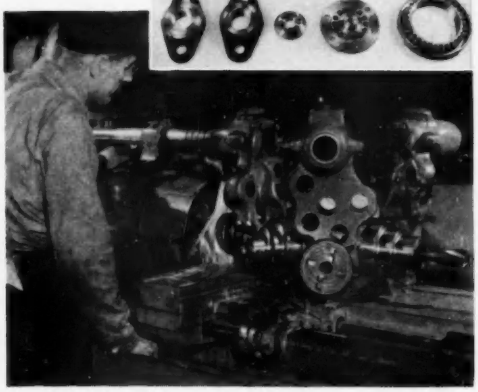
The photo shows a male flange being formed. This is followed by a drilling operation. After that, the operator removes the male flange and chucks a female flange (using same chuck jaws). Passing the next turret face, work is then begun on this flange. From stations four and five the female flange is drilled and faced. Turret station six is then passed and the operation is complete . . . and a male flange is again handled.

The nice feature of this setup is that with one set of tools on the machine, you complete *two* mating parts. This way you're always sure the parts will match perfectly. Moreover, since alternate pieces are machined, there's no problem in keeping quantities even. Total time for a pair of these parts is an even 5 minutes.

Typical parts handled in pairs on the Fastermatic.



Small parts, even in small lots, are economically produced in pairs by the Fastermatic Automatic Lathe.



Male flange being formed. After next drilling operation, female flange is machined. Then male flange again.

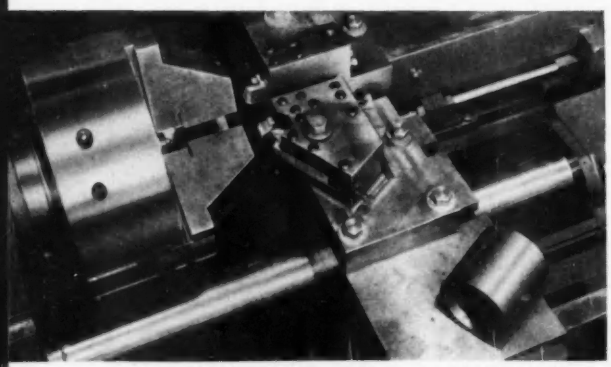
PISTONS BORED AND CENTERED IN 1ST OPERATION

No. 12 Hydraulic Automatic Lathe Combines Machining of Skirt and Centering of Dome

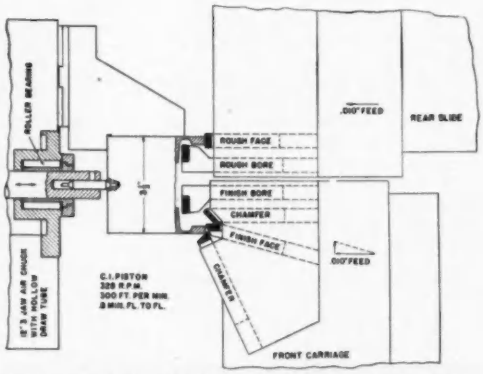
The main operations are on the skirt end of this cast iron tractor piston. The rear slide feeding longitudinally rough bores and faces the skirt. As this slide withdraws, the front carriage moves longitudinally to finish bore and chamfer the ID. It then swings in to finish face and chamfer the OD. It is then withdrawn from the position to provide tool relief.

After operations on the piston skirt, the No. 12 Hydraulic completes its job by centering the piston dome. This is handled by the back boring attachment in the spindle. Floor to floor time is .8 minute. Several sizes of pistons are handled by this No. 12 Hydraulic, all with fully automatic operation.

Combining boring of skirt and centering of dome saves time and provides complete concentricity for following machining operations.



Close up of Tooling for boring and facing skirt end of piston and centering dome end.



Cast iron tractor piston job on the No. 12 Hydraulic Automatic Lathe.

GISHOLT

TIME-SAVING IDEAS

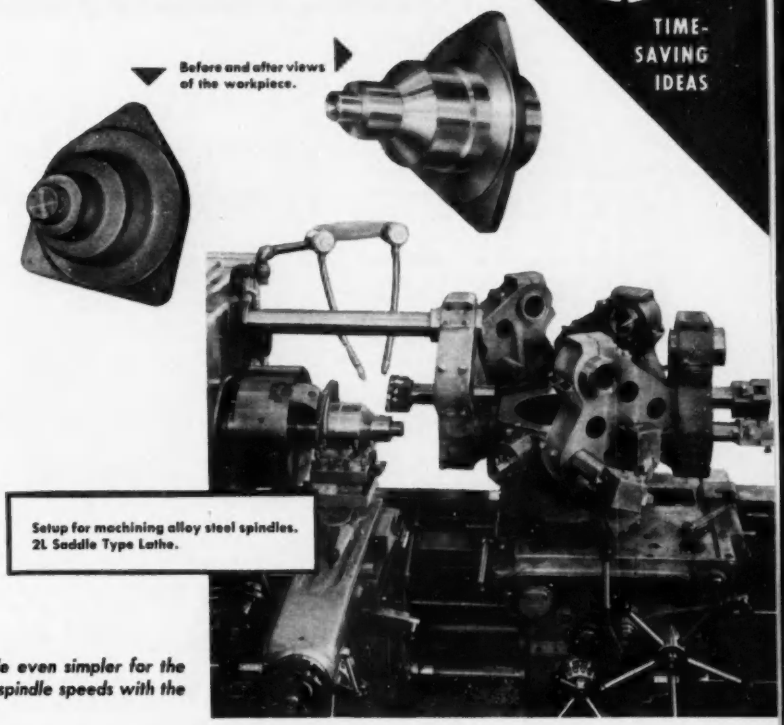
EASY DOES IT...WITH A 6-SPEED CHANGE OF PACE

Saddle Type Turret Lathe Cuts Time Lag with Speed Selector

While the operations needed to finish these spindles are all relatively simple, the job could be a trouble-maker on a less able machine than this 2L Saddle Type Turret Lathe.

Here's why: The part's a tough steel forging weighing in at 103 lbs. and finishing at 93 lbs. Not much stock removed, to be sure, but it takes carbide to do it. The workpiece is chucked on the previously turned short rear hub with a standard 3-jaw airchuck to speed up handling. Standard tools are used to finish all twelve outside diameters.

With the many diameters to be machined on the part, six different spindle speeds are required . . . an easy matter for the Gisholt with its Hydraulic Speed Selector which gives instant, accurate speed changes. Floor-to-floor time for these husky parts is an easy 14.5 minutes.



Before and after views of the workpiece.

Setup for machining alloy steel spindles. 2L Saddle Type Lathe.

Simple operations on these parts are made even simpler for the operator because of the ease of changing spindle speeds with the Gisholt Hydraulic Speed Selector.

A LITTLE EXTRA TOOLING—A LOT OF EXTRA PRODUCTION

Ram Type Turret Lathe Completes Pulleys in Single Chucking

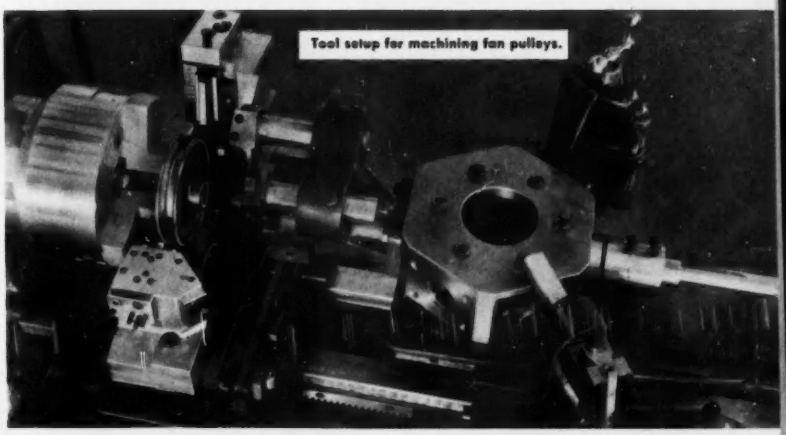
Here's another example of where careful attention to tooling is paying off in increased production. The part is a V-belt pulley and the machine is a standard No. 3 Ram Type Turret Lathe.

The part is held in special top jaws on a standard Gisholt 3-jaw scroll chuck. All boring, turning and facing of the hub are handled by multiple tooling on three faces of the hexagon turret. The large OD is also turned from here.

Special tools are used on the cross slide. In place of the standard quick-indexing tool post on the front of the slide, there is a special tool block. These tools not only rough out the groove, but straddle face the sides as well.

On the rear of the cross slide is another special tool block. Tools here finish-form the groove and finish-straddle face the flanges.

By using special tool blocks on both the front and rear of the cross slide, all machining on these pulleys is done in one chucking.



Tool setup for machining fan pulleys.

GISHOLT

GISHOLT

TIME-SAVING IDEAS

TAKING THE TROUBLE OUT OF TAPPETS
. . . WITH SUPERFINISH

9 Spindle Superfinisher Does High Volume Work

Here's another forward step for extending and improving engine performance. This time it's valve tappets that are being Superfinished. Doing this high production job is a Model 53A Superfinisher. Here's how it operates:

The machine has nine spindles in a rotating base. This operates continuously, like a "merry-go-round." Each work spindle has a collet to hold the tappet. Above is a Superfinishing head. Collets and heads rotate in opposite directions. During the machine cycle the flat Superfinishing stones scrub off the amorphous metal on the cam surface of each tappet.

Superfinishing complete, the head is raised and an angular head comes in to chamfer the corners. Then, as the spindle returns to the unloading position, rotating stops, the collet opens, and the tappet is partially ejected. The operator then takes out the finished tappet and replaces it with an unfinished tappet. Production is 600 to 800 parts per hour.

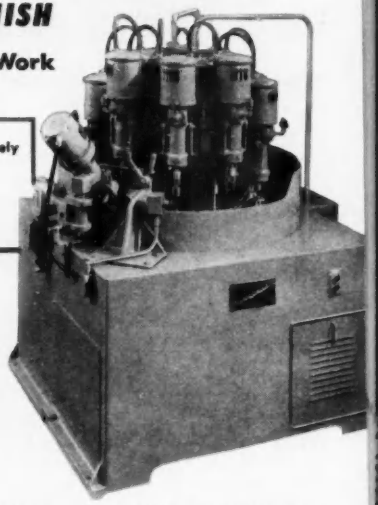
Superfinishing is solving "wearing" problems in many industries.

Superfinisher produces 600 to 800 finely finished valve tappets per hour.

★ ★ ★

Close-up showing special Superfinishing unit for chamfering OD of tappets.





The textbook *"Wear and Surface Finish"* gives the complete story. Ask for your copy.

Better, longer lasting valve tappets are produced in this high production Superfinishing setup.

FLYWHEELS IN ALL SIZES BALANCED ON THIS ONE MACHINE

Handled on Efficient Production Basis

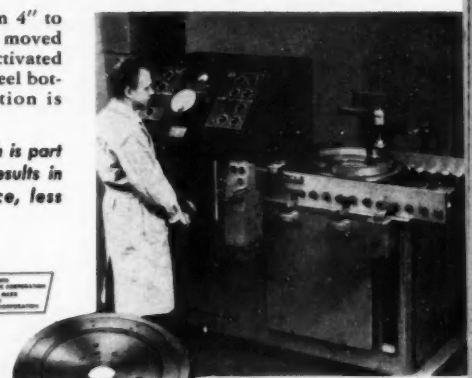
Here is the way flywheels in a large variety of sizes are balanced by a well known engine manufacturer. A Gisholt DYNETRIC Type UV1 Balancing Machine takes care of all production, with parts weighing from 25 to 400 lbs.

A roller and guide arrangement, adjustable to handle flywheels from 8½″ to 32″, carries the flywheels from the assembly line to the machine and back. As the flywheel is located in position on the Balancer, a hydraulically operated mechanism raises it from the rollers for support by the spindle.

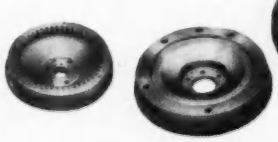
After the quick balancing operation is completed, the flywheel is turned to the indicated angle of unbalance. A sliding prick-punch, which can be set at any radius from 4″ to 16″ from true center, is then moved to the proper location and activated to mark the spot on the flywheel bottom where drilling correction is made.

This balancing operation, which is part of assembly line operations, results in smoother engine performance, less engine vibration.

DYNETRIC BALANCERS GISHOLT



Type UV1 Balancer for balancing tractor engine flywheels.



A few of the many sizes of flywheels balanced.

No 11-1252

603

GISHOLT

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Automotive and Aviation Packaging

(*Continued from page* 41)

weight is 65 lb and the weight of the contents is 268 lb. The package consisted of a floating pack and a wire bound container made to military specification, MIL-B-107A. One of the features of this design over the former method is the saving of $1.10 per unit. Due to the lighter tare weight than the former double bottom wooden box, savings from $0.746 to $1.235 per unit have been realized in freight costs.

Also in the export packaging competition, the third prize, for a packaged tank engine flywheel assembly, went to the Ford Motor Co. This container was a nailed wooden box with a screwed on lid and attached interior blocking. Advantages claimed for this pack are ease of packing and unpacking, and the fact that the container is re-usable. According to Ford engineers, no damage claims have been reported when this package has been handled by forks, hooks, or slings.

Palletized air compressors won a second prize for packages suitable for materials handling ease. The Automotive Air & Vacuum Power Brake Equipment Div. of Midland Steel Products engineered the container. Its main advantage is that it requires less handling at shipping and receiving points than the former individual corrugated cartons.

Approximately 100 industrial firms took part in the three-day exposition. Several exhibits included actual demonstration of materials handling equipment, packaging materials, package assembly, and packaging printing or identification.

Yale and Towne, Philadelphia Div., displayed a recently-announced 2000 lb capacity forklift truck, called the Trucker. This electric industrial vehicle has a 108 in. lift with a 68 in. mast and is claimed to have a very short turning radius.

An exploded view of an automotive engine with color coding to indicate the various military packaging requirements for various engine parts, was shown by Reynolds Metals Company. The company had two demonstrators on hand to show personnel attending the exhibit how these various parts were packaged by utilizing aluminum foil. Also displayed by Reynolds was a new heat-sealable pouch composed of Kraft paper laminated with aluminum foil. A vapor corrosion inhibitor is also used. This package is currently undergoing tests by General Motors. Its main features are that it is dust-proof, water resistant, grease proof, and inhibits corrosion.

Announced for the first time as available to the trade, and on display at the show, was a forklift truck of the take-it-or-leave-it type put out by Baker Raulang. With this truck, the pallets may or may not be picked up with the load. It is particularly useful for loading trucks or freight cars and is said to be an answer to the pallet return problem, according to the company. This new unit has a 4000 lb capacity and is electric powered.

Adolph Gottscho, Inc., Hillside, N. J., demonstrated one of its pack-

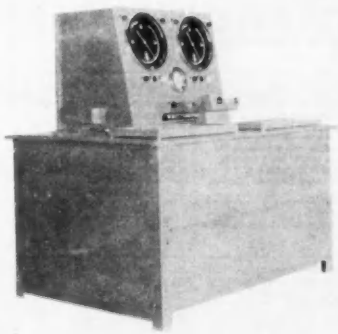


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3 times faster

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One man and a Whittington Vacuum Testing machine can easily and accurately test 2,400 castings in eight hours. The same man could test only 960 castings by the pressure method. Vacuum testing eliminates submersion, plugging of holes, clamping and the hazards attributed to pressure testing. Any part can be tested with no threat of distortion. For the inside story on vacuum testing

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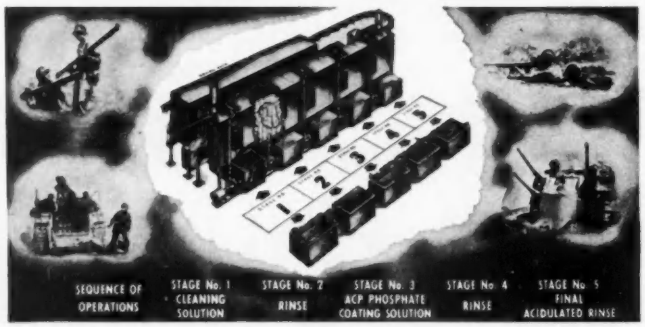
WHITTINGTON PUMP AND ENGINEERING CORPORATION

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AMERICAN CHEMICAL PAINT COMPANY

AMBLER CHEMICALS ACP PROCESSES PENNA.

Technical Service Data Sheet
Subject: METAL PRESERVATION AND PAINT PROTECTION WITH ACP PHOSPHATE COATING CHEMICALS



U.S. ARMY PHOTOGRAPHS COURTESY OF "ORDNANCE MAGAZINE"

Typical spray and dip phosphating equipment and some ordnance products that are now given a protective phosphate coating for extra durability under all kinds of severe exposure conditions. Both military and civilian applications of ACP phosphate coating chemicals are shown in the chart below.

SELECTION CHART OF ACP PROTECTIVE COATING CHEMICALS FOR STEEL, ZINC, AND ALUMINUM

METAL	ACP CHEMICAL	OBJECT OF COATING	TYPICAL METAL PRODUCTS TREATED	GOVERNMENT SPECIFICATIONS
STEEL	"GRANODINE" Zinc Phosphate Coating Chemical	Improved paint adhesion	Steel, iron, or zinc fabricated units or components, automobile bodies, refrigerators, washing machines, cabinets, etc.; projectiles, rockets, bombs, rifles, small arms, belt links, cartridge tanks, vehicular sheet metal, tank belts and links, recoilless guns, etc.	MIL-S-5002 JAN-C-490, Grade 1 JAN-F-495 U.S.A. 57-0-2, Type II, Class C U.S.A. 51-70-1, Finish 22.02, Class C U.S.A. 50-60-1 16 E4 (Ships)
	"PERMADINE" Zinc Phosphate Coating Chemical	Rust and corrosion prevention	Nuts, bolts, screws, hardware items, tools, guns, cartridge clips, fire control instruments, metallic belt links, steel aircraft parts, certain steel projectiles and many other components.	MIL-C-16232 U.S.A. 57-0-2, Type II, Class B U.S.A. 51-70-1, Finish 22.02, Class B Navy Aeronautical M-364 U.S.A. 72-53 (See AN-F-20)
	"THERMOIL-GRANODINE" Manganese-Iron Phosphate Coating	Wear-resistance anti-galling, safe break-in of friction or rubbing parts. Rust proofing.	Friction surfaces such as pistons, piston rings, gears, cylinder liners, camshafts, tappets, crankshafts, rocker arms, etc. Small arms, weapon components. Hardware items, etc.	MIL-C-16232 U.S.A. 57-0-2, Type II, Class A U.S.A. 51-70-1, Finish 22.02 Class A Navy Aeronautical M-364 U.S.A. 72-53 (See AN-F-20)
	"GRANODRAW" Zinc-Iron Phosphate Coating	Improved drawing, extrusion, and cold forming	Blanks and shells for cold forming, heavy stampings; tubs; tubing for forming or drawing; wire; rod; etc.	———
ALUMINUM	"ALODINE" Protective Coating	Improved paint adhesion and corrosion resistance	Aluminum products of similar design such as refrigerator parts, wall tile, signs, washing machine tubs, etc; aircraft and aircraft parts; bazookas (rocket launchers), helmets, belt buckles, clothes dryers, clothesline, rocket motors, etc., aluminum strip or sheet stock.	MIL-C-5541 (See also QPL-5541-1) MIL-S-5002 AN-F-20 U.S. Navord O.S. 675 16 E4 (Ships) AN-C-170 (See MIL-C-5541) U.S.A. 72-53 (See AN-F-20)
ZINC	"LITHOFORM" Zinc Phosphate Coating Chemical	Improved paint adhesion	Zinc alloy die castings; zinc or cadmium plated sheet or components; hot dip galvanized stock; galvanneal; signs; siding; roofing; galvanized truck bodies; etc.	QQ-P-416 RR-C-82 JAN-F-495 AN-F-20 U.S.N. Appendix G U.S.A. 72-53 (See AN-F-20)

CHEMICALS ACP PROCESSES

WRITE FOR DESCRIPTIVE FOLDERS ON THE ABOVE CHEMICALS AND FOR INFORMATION ON YOUR OWN METAL PROTECTION PROBLEMS

CHEMICALS ACP PROCESSES

age marking machines called the Markocoder. The unit shown printed four sides of a corrugated container. These machines are particularly adaptable for marking boxes where one type of box may be used for several different parts. This eliminates a problem of storing numerous similar empty boxes with different markings as the machine marks the unit after it is packaged.

An interesting container for packaging jet engine blades was exhibited by National Metal Edge Box Co. This container, which is suitable for a complete set of compressor or turbine blades, is assembled and reinforced by a metal edge. It is used primarily by the manufacturers of the blading for shipment to various gas turbine assembly plants.

A rather unique material consisting of two different steel channel sections along with a variety of fittings was shown by Ainsworth Manufacturing Co. These channels may be cut according to size to suit the need of users for racks, conveyors, workbenches, hangers, and supports. Called Mult-A-Frame, the equipment built by this material can be moved, adapted, or converted to meet new and different production storage and maintenance requirements.

For printing pressure - sensitive tapes that are so necessary for identifying many items in the automotive industries, Markham Machine Co. displayed its Model 26-A printer. Having a capacity of up to 2½ in. in width and up to six in. long, the unit prints in one or two colors and automatically rewinds the tape.

A high-tensile, waterproof, pressure-sensitive tape was displayed for the first time by Polyken Div. of Bauer & Black. This tape which has a 200 lb per in. width tensile strength has non-staining and non-splitting qualities.

Several interesting examples of wirebound crates, wirebound boxes, nailed wooden boxes, and corrugated stapled and taped boxes were displayed by Rathborne, Hair and Ridgway Box Co. The company showed one of its latest wirebound crates which is made for packaging a tractor driven generator. This particular application won honorable mention in the packaging competition.

Another interesting display in the automotive line was the Gould National Batteries, Inc., booth. Here, the company illustrated the various research that goes into battery manufacture. It also exhibited its latest Z-plate type battery. Plate grids have horizontal and vertical members that are claimed to contain a high propor-



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Have you been receiving your copy of "Sleeve Bearing Topics" . . . the convenient reference on materials, designs, new developments and applications of sleeve bearings, bushings and similar precision parts. We'll send back issues while still available. Your business letterhead request brings your copy . . . write today.

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tion of power producing active material and are said to be nonporous and completely solid.

At one of the technical sessions, R. F. Weber, general supervisor, Materials Handling Research, International Harvester Co., devoted a portion of his paper on the trends in materials handling. He said that among the things that industry is looking for is a narrow-aisle lift truck. Other items include various types of grabs and rollover devices, forkless grabs, improvements in conveyors, better racks for storage, and special device transportation equipment. He predicted improvements in storage practices in the next year to conserve the large areas now wasted through antiquated practices. Another tendency is to eliminate the use of pallets in favor of unit loads for shipping and storage. Where still required for shipping, Mr. Weber stated that the light expandable type pallets will be preferred.

In the assembly departments of Stewart-Warner Corp., the trend has been to conveyorize, according to Dick A. Miller, assistant to director of engineering and production. Mr. Miller stated that conveyorized systems are the only solution to developing greater efficiencies and to meeting the competition of present day manufacturing. With continual rise in costs of raw materials and labor, the next best bet is to reduce costs by the system of mechanical handling, he went on to say.

Speaking on fork truck attachments, W. J. Dernberger, Ford Motor Co., said that there are two things missing in many instances. One of these is the coordination and combination of mechanical and hydraulic devices. The other is the opportunity to exchange from one fixture to another, in a matter of seconds instead of minutes.

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WOODEN BOXES and CRATES
CORRUGATED FIBRE BOXES
BEVERAGE CASES
PALLET TRAYS . . . PALLETS

JAN-P-106A	Wood Export
MIL-B-107A	Wirebound Export
NN-B-621b	Wood Domestic
NN-B-631c	Wirebound Domestic
NN-B-601b	Cleated Plywood-Domestic
JAN-P-105A	Cleated Plywood-Export
LLL-B-631c	Fibre Corrugated-Domestic
NN-B-591a	Fiberboard, Wood, Cleated
MIL-B-2427	Wood Ammunition Boxes
JAN-P-132	Wood Crates-Unsheathed
MIL-C-11133	Wirebound Crates-Domestic (QMC)

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New Piston

(*Continued from page 74*)

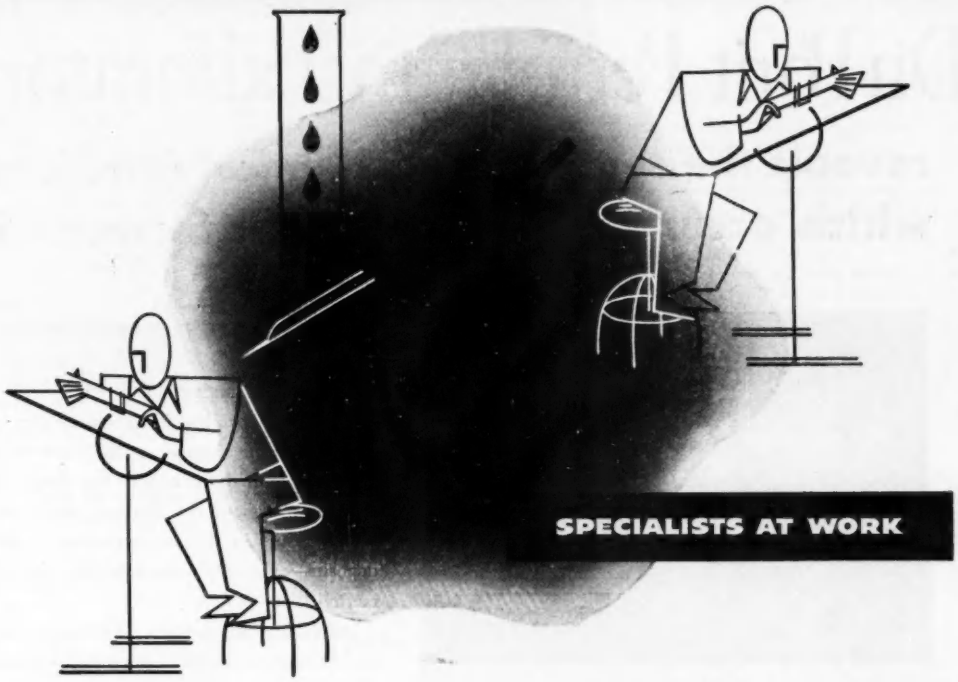
piston finishing, the pressure on this steel insert is relieved by cutting double, horizontal slots in the skirt just above the insert. This naturally allows the compression in the steel insert to relieve itself forcing the skirt, below the slots, outward in tension in a cam shape.

In actual operation, these double horizontal slots act as heat dams, diverting the heat flow into the pin piers which are integral with the head and which move outward in direct ratio to the heat applied to the head of the piston. This reverses the strain on the steel insert and allows the skirt (which has been fitted at 0.001 in. or less) to follow the steel insert inward and away from the cylinder wall. This takes place in direct ratio to the head temperature, before any scuffing or seizing can occur. As the engine cools, a reversal of strain takes place, allowing uniformly close clearances to be held at temperatures from —20 F to 200 F, according to the manufacturer.

The Sterling plant in Saint Louis is now engaged in producing Conformatic pistons for many types of automobile, truck, tractor and aircraft engines.

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Specialization produces most of industry's modern triumphs—from drawing board to finished mechanisms. That's why AC specializes on equipment to make automotive products serve better—and why more than 300 manufacturers standardize on AC quality products. AC's "know-how" is backed by expert engineering service to adapt these better AC products to your particular needs. Your inquiries are invited.

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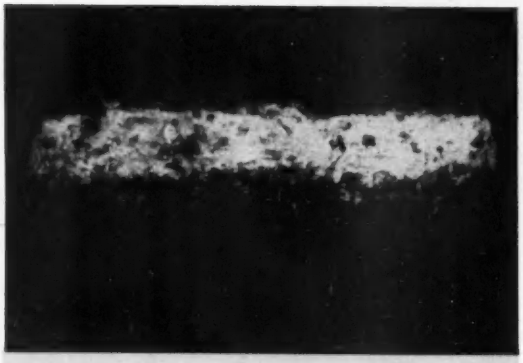
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AC SPARK PLUG DIVISION GM GENERAL MOTORS CORPORATION

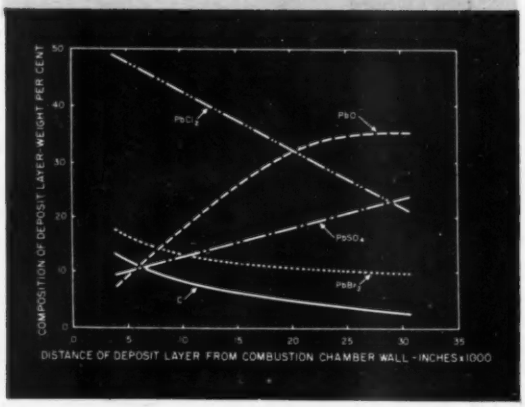
New information developed at the

Du Pont Petroleum Laboratory

reveals the sequence of chemical reactions which occur in engine deposit formation



DEPOSIT STRUCTURE CHANGES with deposit growth, as shown in the deposit cross-section above, from a mixture of black carbonaceous material and low melting lead salts at the cool chamber surface to cream colored, high melting lead salts of the hot deposit surface. This change in structure is confirmed by the chemical composition of deposit layers shown below.



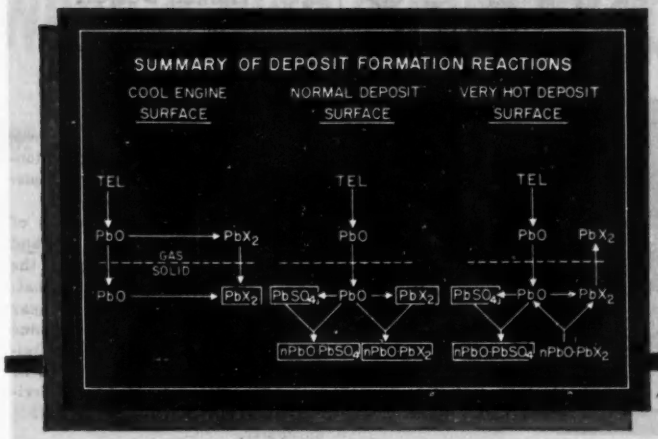
AUTOMOTIVE and petroleum engineers have long known that the formation of deposits on combustion chamber walls increases the tendency of fuels to knock. But very little was known about the reaction mechanisms which result in the accumulation of these deposits—especially with fuels containing tetraethyl lead.

Practically all modern automotive fuels contain a tetraethyl lead antiknock compound. Although almost all of the tetraethyl lead decomposition products are removed from the combustion chamber with the exhaust gases, a small amount remains on the chamber walls in the form of inorganic lead salts. Engine deposits also contain a certain amount of carbonaceous materials from incomplete combustion and both metallic and nonmetallic compounds introduced with the air, fuel or oil, and from engine wear.

THESE DU PONT STUDIES —part of a continuing series of systematic investigations on the mechanisms causing combustion chamber deposits—were limited to the reactions leading to the formation of the lead salt portion of the deposits.

The wide variety of lead salts in deposits are formed as a result of chemical reactions which occur in the combustion chamber after

DU PONT SUPPLIES A COMPLETE LINE OF GASOLINE ADDITIVES
Tetraethyl Lead Compounds (Motor Mix—Aviation Mix) • Antioxidants • Metal Deactivator • Dyes



WHEN THE WALLS are clean and relatively cool (ca. 200°C.), the reactions result in lead halide deposit formation. After deposit growth has produced an insulating layer, the surfaces are hotter and a variety of higher melting compounds are formed. When areas of the combustion chamber such as the exhaust valve become very hot, the deposit composition changes so that only very high melting compounds are formed.

the fuel-air charge is burned. And the stages in which reactions may influence deposit formation are:

1. Combustion.
2. Vapor state reactions following combustion.
3. Condensation of lead compounds on chamber wall.
4. Gas-solid reactions between lead salts and chamber gases.
5. Solid state reactions between lead salts in deposit.
6. Vaporization of lead salts.

AFTER STUDYING EACH of these stages in the reaction sequence shown, the Petroleum Laboratory arrived at the following conclusions:

The course of the reactions is dependent on the temperature of the combustion chamber walls. The compounds found in the deposit and the reactions by which they are produced under each of the temperature conditions studied are shown in the chart above.

Gaseous lead oxide, produced from the decomposition of tetraethyl lead, does not undergo vapor state reactions except when the gas layer near a clean combustion chamber surface is cool. Under these special and transitory conditions it may be converted by hydrogen halides to gaseous lead halides.

Solid lead oxide which condenses has a short life as a deposit constituent. It is attacked by acid gases to form simple lead salts or reacts with the simple lead salts in solid state reactions to form complex lead oxysalts.

The above studies will help chart the course of developments aimed at preventing, or at least reducing, deposit formation. This work on deposits is part of a continuing research program at the Du Pont Petroleum Laboratory. Since Du Pont is a major supplier of tetraethyl lead and other gasoline additives, the aim of this program is to help refiners improve fuel performance through the use of additives.

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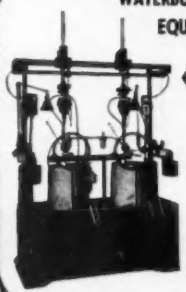


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NEW force-feed head for faster grinding. Available as original equipment or for conversion.



Timken-Detroit Axle and Gear Plant

(*Continued from page* 53)

the new Michigan Tool gear hobbers which are claimed to have exceptionally high productivity, using multiple-lead hobs.

One of the important features of T-D gear practice is that helical and spur gears all are shaved in the green. To this end they have a battery of four Michigan Tool gear shavers, including one large machine for shaving the bull rings. Incidentally, these gears also have the gear teeth shot peened in a special American Wheelabrator machine to enhance durability.

A noteworthy development, subject to experimental production testing, is the induction hardening of bull ring teeth. A special Tocco induction hardening machine is being placed in operation to try out the practicability of this procedure. In the present setup bull rings will be preheated in a furnace then presented to the Tocco unit for hardening.

Heat treating is perhaps one of the most impressive departments of the new plant, boasting a large installation of new equipment, including—a large battery of continuous-type Surface-Combustion gas carburizing furnaces; a Salem furnace; two Holcroft furnaces; and the latest type Surface-Combustion annealing furnace. S-C gas carburizing furnaces are of two-row and three-row type, capable of impressive productivity. Incidentally, the gas carburizing furnaces are served by an installation of Gleason gear quenching machines.

One of the new features in heat treat is an S-C "dry cyanide" hardening furnace, employing a gas mixture for the purpose. This is used primarily for hardening a variety of thin thrust washers.

Heat treating facilities and techniques are so extensive that no effort will be made to provide details in this article. However, this department will be covered in another article to be published in the near future.

YOUR JOB IS CLEAR —GET IN THE SCRAP to keep steel coming

NON-FERROUS SCRAP is needed too!

When a high-strength steel is needed

for severe cold-formed shapes like these bumpers

Specify → **N-A-X** HIGH-TENSILE STEEL

and get all of the requirements of SAE 950



When a material meeting the requirements of the high-strength, corrosion-resisting steels of SAE Specification 950 is used for severe cold-formed shapes, it will pay to investigate N-A-X HIGH-TENSILE steel—the low alloy steel with *built-in formability*. Its finer grain and higher hardness also result in brighter luster when ground and polished for plated parts.

GREAT LAKES STEEL CORPORATION
N-A-X Alloy Division
Ecorse, Detroit 29, Mich.

NATIONAL STEEL CORPORATION

Coating Metals With Aluminum

(*Continued from page 39*)

refractory properties and can withstand high temperatures for long periods of time. Above 900 F the diffusion reaction that formed the bonding layer continues until the cast layer is converted to iron-aluminum alloys or it is converted into aluminum oxide.

Where the strength of steel is adequate, mollerized parts may be substituted for expensive alloys without sacrificing resistance to heat and corrosion. Mollerized steel should find wide application in heat exchangers, muffler parts, exhaust tubes and pipes, furnace walls and grates, and heater jackets. It is well adapted for use in marine and industrial atmospheres where galvanized steel is hindered by its bulky and unsightly corrosion products. The film of aluminum oxide ever present on any piece of aluminum or on mollerized steel offers excellent protection to atmospheric corrosion.

Special applications are constantly being discovered. An aircraft manufacturer needed the shear strength of steel rivets to fasten aluminum sheets together. To avoid bimetallic corrosion the rivets were mollerized. Another manufacturer was faced with the problem of brazing a steel disk to an aluminum tube. This was solved by first mollerizing the disk and then brazing it with aluminum brazing metal.

Aircraft manufacturers experienced some difficulty in forming titanium. On deep draws the titanium tended to gall. Sample sheets of titanium were mollerized and drawn without galling. The soft aluminum coat served as a die lubricant.

Mollerizing offers economies over hot-dip galvanizing. A one mil thick coat of zinc applied to both sides of a sheet weighs 1.3 oz sq ft. The same thickness of aluminum coat weighs only 0.5 oz sq ft. At current market prices the zinc required to cover both sides of a sheet 100 sq ft in area with a one mil coat costs $1.37 (17¢ per lb). If aluminum is substituted for zinc the cost of aluminum is only $.63 (20¢ per lb).

Metal losses through oxidation are minimized by the protective salt vapor atmosphere that covers the aluminum layer. The heating efficiency of salt bath furnaces if very high and the transfer of heat from the molten salt to the aluminum by conduction and radiation is more efficient than that of gas fired zinc kettles which heat by convection.

Maintenance costs are low. Hot spot problems of galvanizing kettles are eliminated by self sealing salt bath furnaces. Periodic sludging and rectification of the bath are the only required treatments to maintain the fluxing action of the salt. Salt drag out on the work is very slight because the molten salt is wiped from the work as it passes through the molten aluminum.

Cleaning techniques and labor costs of both cleaning and dipping are comparable to that of hot-dip galvanizing with the exception that work should be dried before immersion in the furnace.

U. S. and Canadian patents protecting the above-described aluminum coating method are owned by the American Mollerizing Corp., Beverly Hills, Calif., which licenses other firms to use the process.



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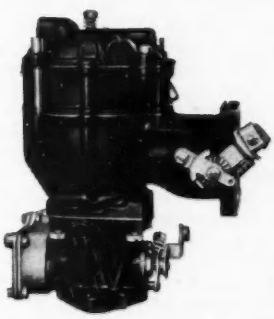
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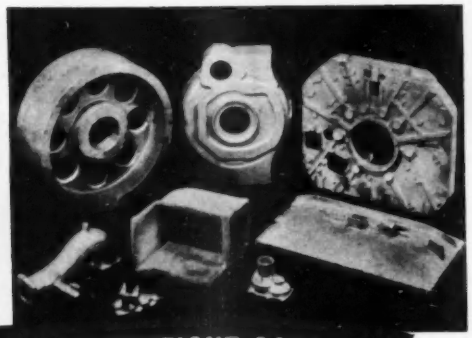
In the practical field of commercial transportation, product preference is determined solely on performance. Nothing contributes more to the achievement of this desirable end than efficient carburetion. You can be sure that manufacturers whose vehicles are equipped with Zenith, the leader in the field of heavy duty carburetion, have measured carburetion costs in lasting terms rather than initial expense. Zenith's rugged construction, strong idling, freedom from stalling and response to every power demand gives any commercial vehicle added sales appeal. It pays to specify Zenith — the engineers' choice for trouble-free operation.

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New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 64)

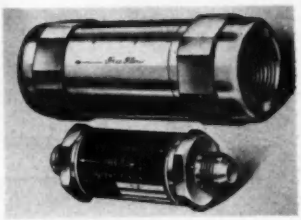
The laminated stator assembly is positioned between a flanged cast iron drive end housing and a cast iron rear housing. The breaker plate is mounted on the rear housing. The individual coil leads are carried to a terminal plate.

This new ignition system is said to be capable of producing output potentials up to 30,000 v with extreme reliability. It is claimed that the system will allow engines to run at least six months without shutdown, even for inspection of spark plugs. *American Bosch Corp.*

Circle P-8 on page 65 for more data

Hydraulic Surge Damping Valves

Designed to prevent damaging shock impulses created by sudden starting, reversing direction of flow, or the abrupt release of high pressure into a low pressure area, hydraulic surge damping valves now available are said to adjust automatically to any working pressure up to 5000 psi.



The valves, which are available in both aviation and industrial models, are claimed to be adaptable to any hydraulic circuit and are recommended for such applications as at the port of four-way or reversing valves, in a cylinder circuit as an automatic decompression valve, and in any line leading from an accumulator or any part of a circuit where a flow is suddenly started or reversed. Since the units have no moving seals and will not interfere with other functions of the circuit, no adjustments or maintenance are required.

Normally closed, the valves open when pressure is applied to the inlet side. A gradual flow is permitted to

(*Turn to page* 202, *please*)

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Star Service All-Wire & Paper-Strut Hangers

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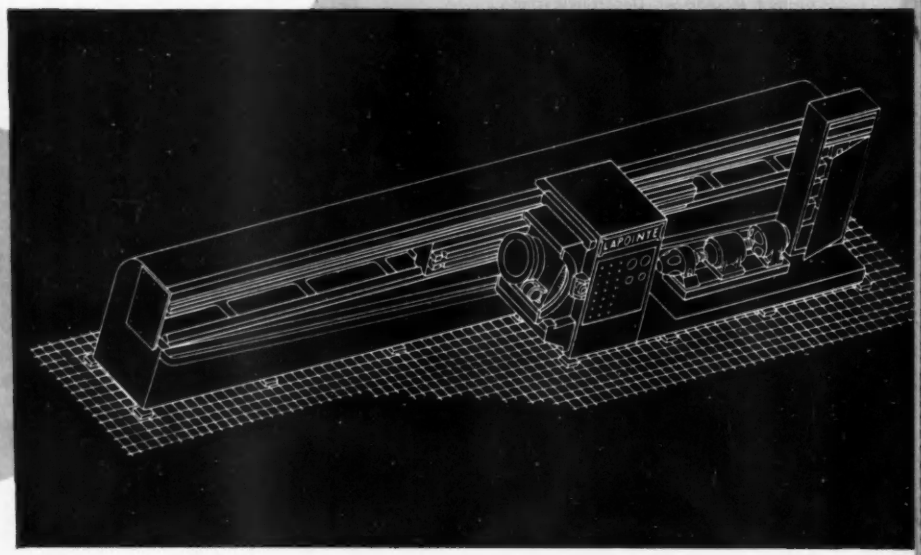


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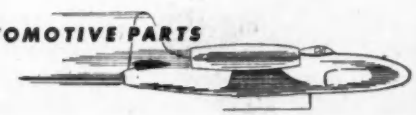
capable of BROACHING SPEEDS in excess of 150 fpm!

Faster than ever before, this DUAL SPEED Lapointe Broaching Machine is available with strokes ranging from 66 inches to 200 inches. All sliding members are lined with natural phenolic plates (another exclusive Lapointe feature) and slide on heat treated meehanite ways. Clamping fixtures operate on hydraulic power.

Rugged, heavy, and rigid, this machine can be equipped with drives up to 200 hp for smooth, powerful high-speed broaching. It embodies the capability, flexibility, simplicity and "guts" that no previously-designed broaching machine ever has had . . . and the maintenance factor is almost negligible.

In short, this machine represents exactly what industry has come to expect from LAPOINTE, the world's pioneer in the art of broaching.

FASTER BROACHING OF JET ENGINE PARTS AND AUTOMOTIVE PARTS



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This new
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SURFACE BROACHING MACHINE

removes the largest amount of material in the shortest possible time, due to its remarkable broaching speed of 150 fpm — and more!

No longer something to hope for in the future, this new machine has already completely proven itself... several have been in service for some time and are performing production miracles in nationally known plants.

DUAL SPEED gives great flexibility!

An exclusive feature is the **DUAL SPEED** (patent pending), which makes it possible to broach at a certain predetermined speed for any part of the stroke, **and at any other speed for the remainder of the stroke.**

This opportunity to combine roughing and finishing operations in the same stroke indicates the machine's flexibility and is the reason why this newest Lapointe machine is so useful for the broaching of certain jet engine parts and automotive parts.

With this outstanding development in broaching — and others to come — it is well to remember now, more than ever, that Lapointe can accept responsibility for the complete job — broaching machines, broaching tools, and fixtures.

Full information about this machine will be given if you ask for literature on the **SRHE-10**



View of machine during assembly

THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
Branch Factory: Watford, Herts., England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

Lamps for 12-Volt Electrical Systems

By Val J. Roper
Lamp Division, General Electric Co., Nela Park.

The decision to use 12-volt electrical systems on several 1953 passenger cars did not pose any new problems to the makers of bulbs; many buses and large trucks have been using the higher voltage for years. The requirements of lighting equipment are essentially the same on all vehicles, and the 12-volt bulbs in use are similar in size and appearance to the six-volt bulbs used on passenger cars. This applies to instrument panel lighting, interior lighting, fog lamps, spot lamps, stop lamps, turn signal lamps, license plate lamps, step lamps, compartment lamps, indicator lamps, and parking lamps.

However, the performance of 12-volt bulbs is not quite as good as that of six-volt bulbs and their cost is somewhat higher. For a given candlepower or wattage rating, the tungsten filament wire of the 12-volt bulb is approximately twice as long and its cross section is about half that of a six-volt bulb. Therefore, the 12-volt filaments do not withstand as much shock or vibration before breaking or "shorting out." Also, due to the greater length, the 12-volt light source is slightly larger and does not provide quite as good lighting results in headlamps, spot lamps, or any other lighting equipment wherein very small source size and accurate control are prime requirements.

The cost of 12-volt bulbs is somewhat higher for two reasons: relatively lower production quantities which limit automatic operations, and constructional differences, chief of which are filament supports, not needed in six-volt types.

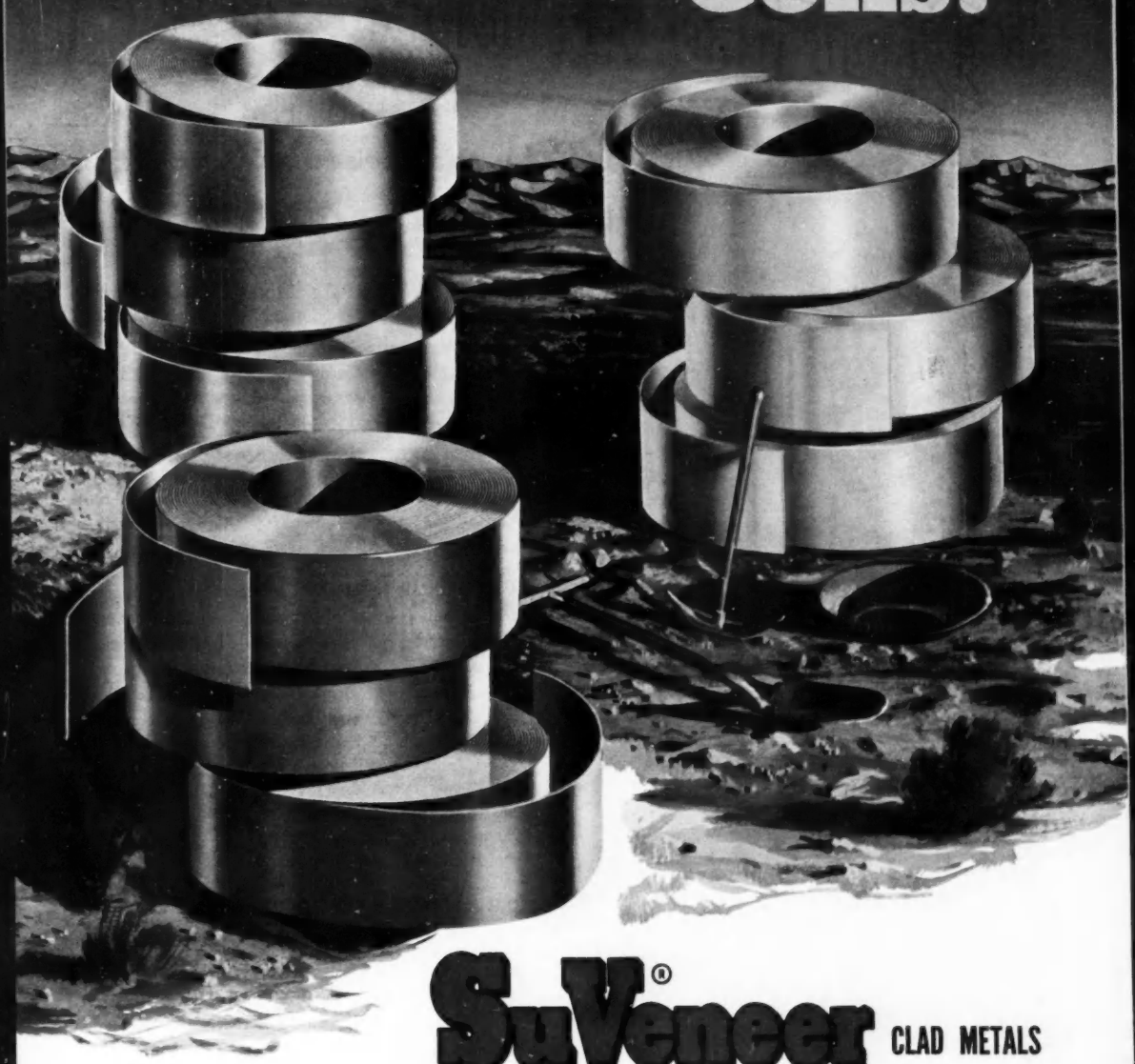
However, these slight disadvantages attending the 12-volt bulbs are not sufficient to offset the advantages to be derived through the use of the 12-volt electrical system. The average driver will probably not notice any difference in the performance of his 12-volt bulbs, excepting that he will have to pay a little bit more for them and may have to replace them sooner. All in all, their performance is good, as has been proved by many years of service on large commercial vehicles.

Of course, the most important lamps on the car from the standpoint of safety are the headlamps. The 1953 passenger cars using 12-volt electrical systems will use sealed beam headlamps. The upper and lower beam patterns of these 12-volt lamps are very similar to the beam patterns of the six-volt sealed beam lamps. If the owners of the new cars will pay just a little more attention to the matter of proper aim of these sealed beam headlamps, they will, on the average, much more than make up for the slight difference in lighting results.

There are two 12-volt sealed beam headlamps available, one for the truck service and one for the passenger car service. That for passenger car service—trade number 4400—has filaments that operate at slightly higher efficiency, and provide light output more nearly matching that of the six-volt sealed beam headlight. The No. 4430, designed for truck operation, is intended for the vehicles which operate many hours at night (and almost every night of the week) and which require a lamp of somewhat longer life design. Hence their efficiency is not quite equal to that of the six-volt lamps.



There's gold for you in "them thar" Coils!



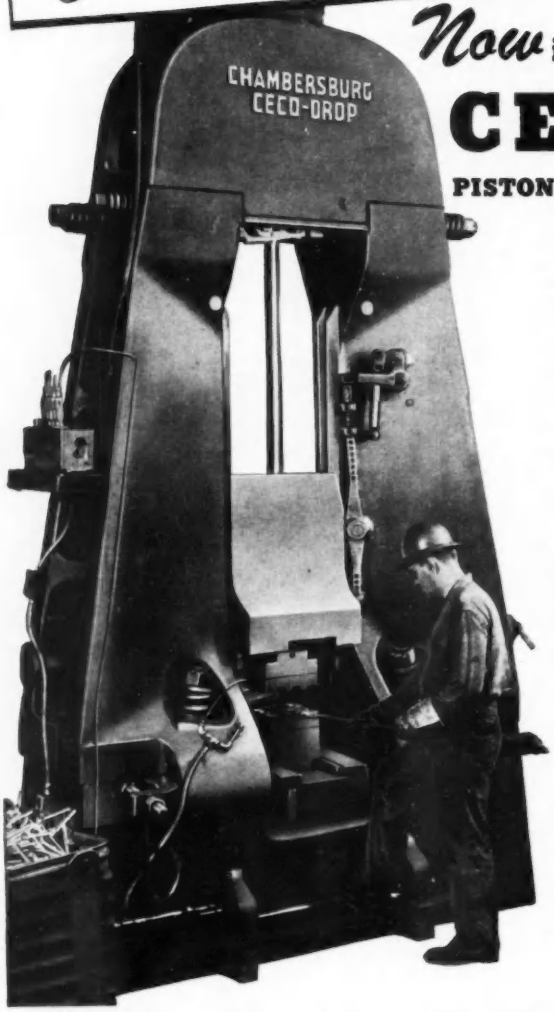
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CORPORATION
CARNEGIE, PENNSYLVANIA

WITH COMPETITION GETTING KEENER—

Down Time becomes more costly!



***Now* is the time to ask about the**

CECO-DROP

PISTON-LIFT, GRAVITY DROP HAMMERS

High labor costs, high material costs can only be offset by increased production per machine. If your board drop hammers are showing signs of use, more and more time and expense is necessary for board replacement, adjustments and repairs; don't wait—investigate CECO-DROP piston-lift, gravity drop hammers now. (Especially consider the fact that Ceco-Drop upper works can probably be installed on your present board drop hammer anvils.)

CECO-DROP HAMMERS are the result of more than a half century of experience in the manufacture and design of hammers. They cost less to operate. There are no board changes, no friction adjustments, and lubrication is automatic. Treadling the Ceco-Drop is easy and not fatiguing, and die alignment is held. The unique stroke adjustment and short stroke control afford a wide range of operation.

Write today for information about Ceco-Drop Hammers. Ask for Bulletin 11-L-0. You'll be glad you did.

CHAMBERSBURG ENGINEERING COMPANY, CHAMBERSBURG, PA.

CHAMBERSBURG

THE HAMMER BUILDERS

Door Latch Rotor

(*Continued from page* 78)

At the fourth station, a punch, shaped like the blank but slightly smaller, is used to push the blank through a die that shaves the contour and brings it to finished size. It is noteworthy that, by leaving the blank in the skeleton it is advanced to the fourth station and correctly located there for concentricity and symmetry without touching the blank by hand. While a separate die in a second press might be used for this shaving, it would require extra handling and precise location, which, with the progressive die, is automatic.

In the fifth station, the die clips off the end of the skeleton which drops into a tote box below the die. An air hose connected to the die blows out shaving scrap, and a second air hose is set so that a jet of air strikes the finished part just after it is pushed through the shaving die and blows it into a tote box for finished parts.

Thus, the progressive die is not only fast and automatic, save for the hand feeding of the ¼-in. stock, but avoids extra handling and an extra press with a separate die and operator. These significant savings lower costs and make the job both fast and economical, besides insuring a product that is held to close tolerances. Actual production possible is about 1800 pieces per hour.

Ford Automation

(*Continued from page* 38)

drawing, the part is automatically removed by means of an extraction device mounted on the side of the press. This device places the roof panel onto a rubber padded trunnion mounted turnover mechanism, as illustrated. Here, the work is taken by means of an automatic transfer unit onto an automatic loader which inserts the roof panel into a 1000-ton Danly press for a trimming operation. This press also has a bed size of 180 in. by 100 in. Once again, an automatic extractor transfer unit and loader are utilized for conveying the part to the next operation. At this phase, the panel is flanged on a triple action Hamilton press similar to the one for drawing. It is of interest that the Danly press is equipped with rubber disks to prevent marring of the roof panel during trim operations.

TRAILMOBILE

RADIUS ROD JOINTS by LORD

29th National Exposition of Power and Mechanical Engineering, Grand Central Palace, N. Y., Booth No. 558 December 1-6, 1952



Look at the Trailmobile radius rod joint shown in close-up at the left. This Lord high performance center-bonded-rubber joint .....

1. Saves manufacturing and maintenance cost,
2. Absorbs the shocks of braking-loads and road irregularities imposed on the radius rods,
3. Provides necessary articulation.

When axle inspections require removal or replacement of radius rod joints, a simple arbor-press operation shortens loss of payload time and reduces actual repair cost. We invite you to avail yourself of our experience in designing and manufacturing precision bonded-rubber parts.

BURBANK, CALIFORNIA 233 South Third Street
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DAYTON 2, OHIO 238 Lafayette Street
DETROIT 2, MICHIGAN 7310 Woodward Ave.
NEW YORK 16, NEW YORK 280 Madison Avenue
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ERIE, PENNSYLVANIA 1635 West 12th Street

LORD MANUFACTURING COMPANY • ERIE, PA.

LORD BONDED RUBBER Headquarters for VIBRATION CONTROL

The Machine Tool Market in Latin America

(*Continued from page 49*)

Brazilian machine tool imports in recent years have shown increasing percentages of large turret lathes, automatic screw machines, threaders, broaching machines and other specialized equipment. Maturity of the Brazilian metal working industry is due in large part to the long standing government policy discouraging imports of finished metal products. Regulations instead favor the purchase of unfinished forgings, castings and rolled shapes. In addition, the government is actively encouraging the growth of a basic steel industry revolving around the $50-million Volta Redonda project.

As a result, a steadily growing number of firms are producing plumbing fixtures, home appliances, railroad equipment and industrial machinery, the bulk of which was imported before the war.

The Sao Paulo area ranks first in this production, accounting for 44 per cent of the total national output. Over 400 machine shops are located here, the most important being Fundicao Brasil and Ernesto Cocito & Cia. Foundry production has expanded over 150 per cent since 1940, but still is inadequate for some requirements.

A number of Sao Paulo firms also are producing small bench lathes, drill presses, shapers and grinding machines. Most of the machines produced follow imported designs rather closely. One source estimates that this production supplies about one half of the country's industrial needs. It is interesting to note that Brazilian-made electric motors are used on all this equipment.

Brazil undoubtedly presents the healthiest economic picture in South America, with all potentials available for continued industrialization. For a number of years, it has occupied first place among Latin American nations with respect to number of manufacturers, value of goods produced and number of industrial laborers. As a result, our machine tool business in this country should continue to expand in coming years.

Mexican machine tool imports have remained relatively stable since the war, due partly to more rigid governmental controls and partly to the well established nature of Mexico's metal fabricating industries. Unlike Brazil, there was less frantic industrial expansion during the war since vital imports from the U. S. were not dependent on available shipping.

During the post-war period, Mexico imported nearly $8.5-million worth of American machine tools. Purchases during the current year are expected to exceed $1.7 million, with about one-third going for turret lathes and automatic screw machines. Stamping presses, powered metal saws and sheet-metal machinery also are flowing into Mexico in increasing numbers.

Because mining and metallurgy have long been associated with Mexico's economic growth, mines and smelters absorb the largest portion of machine shop production. In addition to manufacturing such items as pump impellers, journal bearings, ore crushers and conveying machinery, companies like the Torreon Foundry

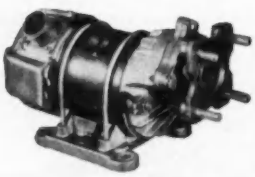
assured
RELIABILITY

Lamb Electric

SPECIAL APPLICATION
FRACTIONAL HORSEPOWER
MOTORS



Motor having substantial power output for computing machines and other types of motor-driven office equipment.



Helical geared fuel transfer pump motor designed for aircraft but adaptable to many industrial uses.

In the hands of users — the real "proving ground" of all products— devices powered with Lamb Electric Motors have won a reputation for long, trouble-free operation.

Motor reliability, a prime requisite for successful product operation, is assured with Lamb Electric Motors because (1) the motor is designed for the specific application, (2) it is built of quality materials to the highest manufacturing standards, (3) it embodies 37 years' experience in the small motor field.

Reliability is but one of the advantages gained through the use of a specially engineered Lamb Electric Motor.

The Lamb Electric Company
Kent, Ohio

In Canada: Lamb Electric–Division of Sangamo Company Ltd.–Leaside, Ontario

Lamb Electric
SPECIAL APPLICATION
FRACTIONAL HORSEPOWER MOTORS



HAULING OUT THE HEAVYWEIGHTS . . . another tough job that demands AMERICAN BOSCH performance

Hustling out the big butts is a mighty tough job — but giant Diesel logging trucks take it in stride. These heavyweight haulers rumble over specially-built logging roads, daily shouldering loads that may scale fifty tons or more. Plenty of dependable power's a "must" — and that's why American Bosch products are on the job.

Reliable, precise fuel injection is one big reason for the sweeping success of the modern Diesel engine. And American Bosch has long been the leading supplier of fuel injection systems to Diesel engine manufacturers. That's because American Bosch Diesel injection pumps and nozzles — although built to amazingly fine tolerances — provide long-lived, economical performance in the severest service.

For over forty years, American Bosch has maintained a unique reputation for advanced design, precision manufacture and widespread, thorough service. Continuous research in the automotive, aviation and Diesel fields helps to keep it that way. American Bosch Corporation, Springfield 7, Massachusetts.

AMERICAN BOSCH





are producing pistons, connecting rods and cylinder heads for mining power units.

Steel mill production, begun in 1900, now is adequate to handle nearly all of the requirements for structural steel, rails and rolled shapes. Mexican foundry practice is well advanced, covering practically all types of castings. A number of firms specialize in brass and aluminum hardware, but the bulk of production is gray iron for such purposes as gratings, public lighting fixtures, pulleys and other small parts.

Talleres Industriales of Monterrey has produced small bench lathes, and attempts were made during the war to build shapers and drill presses. This production, hampered by poor quality and the lack of a protective tariff, is not a factor in the Mexican market.

Argentine tool imports now average less than 10 per cent of what they were during the buying spree of 1947. While slight increases were noted in machine tool purchases last year, the country as a whole faces serious financial difficulties due to loss of overseas markets and crop failures at home. Typical evidence of this trouble was seen last summer when, for the first time, wheat was imported into this predominantly agricultural country. In spite of the present situation, long range prospects appear good for expanding our sales of special-purpose machine tools. Over 250 firms are engaged in gray-iron casting, and a wide variety of products are turned out for industrial and commercial use. Unfortunately, foundries must use imported pig iron and scrap, and present supplies are entirely inadequate.

Railway maintenance and repair have given much business to local machine shops, especially since the war when British controlling interests were bought out. Military hard goods production also has continued at a fairly high rate since the war, helping to expand and diversify machine shop output.

Some factory equipment, food-handling and processing units and road-building machines are made locally under license from foreign companies. In addition, spare parts for the automotive market have continued in production on a small scale since the war.

Machine tools were produced for the first time in 1940, and present annual production is valued at approximately $500,000 (U. S.). Among units being produced are small drill

For Better Hydraulic Brake Cylinders



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Permanent Mold Gray Iron Castings



Send for your copy of the illustrated booklet, "A Picture Tour of the Eaton Permanent Mold Foundry."

Free machinability
Dense, homogeneous structure
Freedom from leakage under pressure
Machines to high, mirror-like finish
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PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

presses, lathes, planers and shapers. While their quality appears good, prices are 10-20 per cent higher than comparable U. S. or European models. Due to the need for conserving foreign exchange, this production should continue to expand.

Demand in other countries, at their present state of development, is principally for small workshop lathes, drill presses and grinders. Of the larger precision type machines, practically all are ordered and imported directly by foreign concerns for use in maintenance and repair departments. While dollar credits continue to be the chief barrier to increased sales, shortages of trained machinists in such countries as Chile and Peru are definitely limiting industrial development. Although extensive efforts are being made to improve educational standards, a high percentage of factory workers have little or no formal training. This shortage of specialized skills and "know how" must be recognized by machinery exporters in this country.

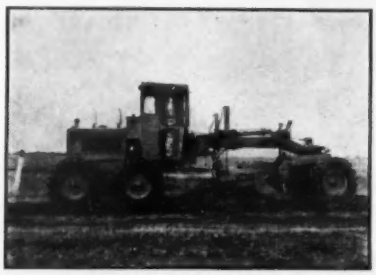
Foreign competition in the machine tool market continues to grow. West Germany especially has made remarkable progress in regaining her prewar customers. Overall estimates are difficult to obtain, but many distributing agencies believe German sources are now supplying about one-fifth of the Latin American imports. In countries such as Uruguay and Argentina, this proportion is of course much higher. The resurgence of German exports since 1948 is traceable to low-profit price structures as well as to the high quality workmanship which, incidentally, many importers are quick to point out.

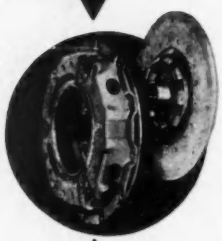
British manufacturers also have gained new markets in Chile, Brazil and Venezuela, but in many instances their delivery schedules are slow due to plant rehabilitation at home. British suppliers have their greatest advantage, of course, in the relative abundance of sterling exchange available in these countries.

Canadian, Italian, French and Swedish machine tools are entering Latin America trading areas in limited quantities and in about this order of importance. Some Czechoslovakian machinery was sold in 1948 and 1949, but this was never a factor in the market.

In spite of this natural and healthy increase in foreign competition, U. S. machine tool exports in future years should continue to grow, provided we erect no new barriers to the sale of Latin American products in this country. As proved by past records, the diversification and industrialization of Latin American economies have beneficial effects on our own industrial exports.

Scarafies—Banks—Crowns





Ditches and Back Slopes

The versatile MOTOR COACH INDUSTRIE'S MCI GRADER has exceptionally good load distribution to give it high tractive effect. ROCKFORD CLUTCHES were chosen to withstand the severe service it must meet. Let ROCKFORD help with your heavy duty power transmission control problems.

ROCKFORD CLUTCH DIVISION BORG-WARNER
315 Catherine Street, Rockford, Illinois, U.S.A.

B-W
B-W ENGINEERING MAKES IT WORK
B-W PRODUCTION MAKES IT AVAILABLE



ENGINEERING BULLETIN SENT ON REQUEST

ROCKFORD CLUTCHES

1952 Vehicle Registrations

(*Continued from page 76*)

combined will total 9,086,780 or 2.61 per cent more than the 8,855,319 registered in the previous year.

These preliminary registration figures are based on the annual survey conducted by AUTOMOTIVE INDUSTRIES for the purpose of establishing a sound estimate of what may be expected in the way of registrations for the 1952 registration year. The motor vehicle commissioners of practically all the states cooperated with us in furnishing their estimates for the entire year, and past experience has proven these estimates to be very close to the final data.

On the basis of these returns 18 states will have registrations of over

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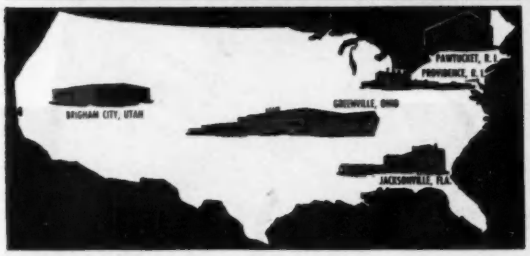
Better Research, Development and Engineering Facilities

Within the finest research and development laboratories in the automotive filter field, alert Fram scientists and technicians constantly develop and perfect Fram products. After exhaustive performance tests in the laboratory, new Fram products and new developments of existing products are given intensive workouts on the Fram test fleet and in the famous Fram Dust Tunnel at Dexter, Michigan.



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Complete engine protection from the outside and from within the engine itself is vitally important to continued top performance. Fram Oil, Air, Fuel and Water Filters and Crankcase Ventilators lengthen the life of engines, decrease maintenance, cut repair bills and increase mileage between overhauls . . . saving motorists time, trouble and money.



Strategically Located Plants Give You Better Service

Widespread manufacturing facilities offer you efficient, high-speed production and fast delivery. The Manufacturers Sales Division, located in Dexter, Michigan, is fully staffed to provide the automotive industry with fullest cooperation in meeting any and all filtration requirements. FRAM CORPORATION, Providence 16, R. I. *Plants in:* Pawtucket, R. I.; Greenville, Ohio; Jacksonville, Fla.; Brigham City, Utah. *In Canada:* J. C. Adams Co., Ltd., Toronto, Ontario.

FRAM
OIL • AIR • FUEL • WATER
FILTERS

FRAM FILTERS BEST

by actual test

Here's why:

Laboratory tests, conducted under rigidly controlled conditions, prove that Fram Cartridges trap from 69% to 114% more dirt than other cartridges tested. Your engines deserve the best . . . and the *best* is *FRAM!*

Manufacturers of...

FRAM OIL & MOTOR CLEANERS ★ FRAM FILCRON REPLACEMENT CARTRIDGES ★ FRAM CEL-PAK REPLACEMENT CARTRIDGES ★ FRAM FILTRONIC REPLACEMENT CARTRIDGES ★ FRAM CARBURETOR AIR FILTERS ★ FRAM GASOLINE FILTERS ★ FRAM CRANKCASE AIR FILTERS ★ FRAM POSITIVE CRANKCASE VENTILATORS ★ FRAM RADIATOR & WATER CLEANERS ★ FRAM FUEL OIL FILTERS FRAM INDUSTRIAL OIL AND FUEL FILTERS ★ FRAM SEPARATOR-FILTER FOR IMMISCIBLE LIQUIDS ★ FRAM CUSTOM-DESIGNED FILTERS FOR SPECIALIZED APPLICATIONS.

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AMA



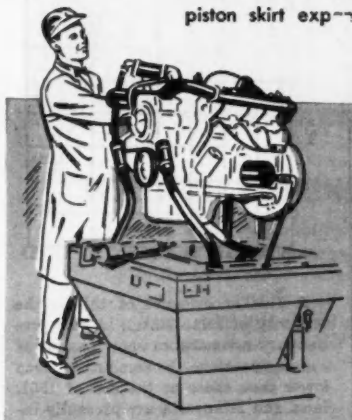
FIT PISTONS TO LESS CLEARANCE

ZINC CONFORMATIC*

Without Danger of Scuffing or Seizing...

"...quieter engines...no more cold slap...reduced friction...no loss of strength or conductivity..." No wonder *Conformatic* is the talk of the trade! This revolutionary new aluminum piston is made to be fitted at .001 clearance or less because an anchored steel tension member actually makes the piston skirt expansion *conform* to cylinder expansion. Long-range performance tests have shown this *Conformatic* control to be so accurate that pistons fitted at .001 have no cold slap at −20°F.—and no seizing or scuffing at 200°F.

Think of what this new piston idea can mean to you! For complete information and technical data, write or phone —



RESULTS OF 1200-HOUR CYCLE TEST

In recent cycle tests made by one of the largest automotive manufacturers, Sterling *Conformatic* Pistons were fitted into a stock engine at .0005 clearance. After operating the engine for 1200 hours, approximately 50% of which were run at 4000 r.p.m. or over, full load, full throttle, the *Conformatic* Pistons were pronounced perfect!

STERLING PISTONS

*T.M. Reg., Patent Applied for

STERLING ALUMINUM PRODUCTS INC. • **St. Louis, Missouri**

"CHICAGO"
precision valve gear parts



Hydraulic Tappets • Mechanical Tappets • Roller Followers • Push Rods • Self Locking and Standard Thread Adjusting Screws • Valve Spring Retainers Split Valve Locks • Rocker Arm Shafts •

Connecting Rod Bolts.....Hydraulic Cylinder Pistons
Cylinder Head Studs.....Cylinder Head Cap Screws
Main Bearing Studs.....Main Bearing Cap Screws
Flywheel to Crankshaft Screws.....Diesel Energy Cells
Wheel Bolts and Studs.....Differential Carrier Screws
Oil Pump to Distributer Shafts.....Remote Control Levers
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Special Screw Machine Parts 1/16" to 5" Diameter • Cap Screws • Set Screws • Nuts • Studs • Taper Pins • Socket Screw Products.

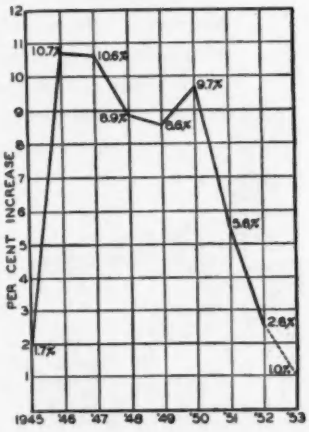
The CHICAGO SCREW COMPANY
2801 WASHINGTON BLVD.
BELLWOOD, ILL.
Established 1872

(*Continued from page* 110)

one million vehicles and while they are only 37 per cent of the 48 states and the District of Columbia, they will account for 71 per cent of the vehicles registered throughout the country. California will rank as number one state with about 4,852,000, exceeding New York which will be in second place by nearly one million registrations. Pennsylvania and Texas, third and fourth place respectively will have well over three million registrations. Ohio in fifth place with slightly under three million is followed by Illinois, Michigan, New Jersey, Indiana and Massachusetts, in the order named.

It is highly significant that the percentage increase in yearly totals of motor vehicle registrations has been declining quite abruptly during the past three years. A glance at the graphic picture of these percentage increases shows that vehicle registrations are leveling off and that the cycle of increases has been completed. Registrations at the end of 1953 will be just about the same as for 1952 or possibly about 1 per cent higher.

POSTWAR YEARLY INCREASES IN TOTAL MOTOR VEHICLE REGISTRATIONS



A further evidence of this is the tendency of some states, in this preliminary estimate, to show passenger car registrations the same as or even lower than those at the end of 1951. Iowa and Minnesota are presently indicating lower registrations for 1952 than in 1951 and Arkansas, Idaho, and North and South Dakota appear as though their registrations will approximate 1951. Final returns, which

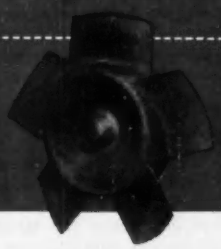
NEED MORE THAN JUST A HEATER?



THIS EVANS *Fresh Air* UNIT IS CUSTOM ENGINEERED AS A COMPLETE HEATING AND VENTILATING SYSTEM

EVANS FEATURES PROVIDE HEAVY DUTY DEPENDABILITY WITH SERVICE-FREE PERFORMANCE

1. Heavy duty fan type low drain motor
2. Heavy duty large capacity core
3. Complete accessibility for inspection or servicing
4. Controls provide accurate selection of warmed air, temperature and flow
5. Adds no recirculated air, warm or cool, in any combination
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◀ POWERFUL EVANAIR FAN CHANGES CAR AIR 3 TO 4 TIMES PER MINUTE

Precision dynamically balanced in lightweight strong metal. Will not slip, impel or bind. Every Evanair fan is exactly the same in characteristics, weight and balance. Aerodynamic design, circulates more air with less noise, less current drain. Material not affected by high or low temperatures. One piece construction, no parts to work loose. Lighter weight results in less load on motor bearings, insuring longer life.

EVANS ENGINEERING IS AVAILABLE TO HELP SOLVE YOUR PROBLEM

The Evans organization is staffed to engineer promptly an installation to your specifications, organized to build prototypes quickly, equipped to conduct precision tests to latest A. S. H. V. E. procedures. Military experience dating back to World War I qualifies Evans to work well with you in meeting the rigid specifications of the Armed Forces. If your needs are for high performance, ruggedly constructed automotive heating and ventilating equipment—custom built to your specifications—it will pay you to consult EVANS PRODUCTS COMPANY, HEATING & VENTILATING DIVISION, DEPT. P-611, PLYMOUTH, MICHIGAN.

EVANS *ENGINEERS CUSTOM HEATING AND VENTILATING FOR A WORKING WORLD ON WHEELS*

will be published in the 1953 Statistical Issue of AUTOMOTIVE INDUSTRIES, released March 15, 1953, will give us a true picture of whether these states will show a gain or a loss over the preceding year.

During 1952 approximately 4,570,000 new cars and trucks will have been registered throughout the country of which 3,800,000 will be passenger cars and 770,000 trucks. This will be about 25 per cent less than the 6,064,753 new registrations of 1951.

Scrappage will be equal to or slightly less than the 3,344,837 which went out of service during 1951. It will be in the neighborhood of 3,225,474 and will consist of 2,686,935 passenger cars and 538,539 trucks.

YOUR JOB IS CLEAR —GET IN THE SCRAP to keep steel coming

NON-FERROUS SCRAP is needed too!

When You Need Pump Replacements...

TUTHILL PUMP GUIDE



Let this TUTHILL PUMP GUIDE Save You Time and Trouble.....

There's a Tuthill positive displacement internal-gear rotary pump to meet your needs in lubrication, hydraulic, coolant, and liquid transfer service.

To help you select the right pump for your replacements, Tuthill offers this handy, letterhead-size reference chart. It shows the Tuthill pumps available for each type of service, complete with capacities, pressures, speeds, packing, mounting and exclusive performance features. It makes the job of picking the right pump easier than ever before. It saves you time, work and trouble.

Write for your Tuthill Pump Guide today!

TUTHILL 25th Anniversary

TUTHILL PUMP COMPANY
939 East 95th Street, Chicago 19, Illinois

AIRBRIEFS

(*Continued from page* 72)

the Plan will not entirely remove the allocation privileges of the Government, however, and the military aircraft program will probably be turned over to the Aircraft Production Resources Agency at Wright Field. This will enable top-priority combat aircraft builders to obtain needed raw materials, but the availability of steel, copper and aluminum may make even this step unnecessary. Folding of CMP may place isolated hardships on civil aircraft builders, both lightplanes and huge transports, but these should be short-lived.

U. S. Leads

U. S. airlines now carry more than half the world's non-Communist passengers, the exact percentage of the total being unknown due to the absence of data on Russian and satellite airlines. According to the Air Transport Association, the U. S. now carries 59 per cent of the passengers, flies 54 per cent of the passenger-miles, 50 per cent of the mail ton-miles, 53 per cent of the revenue ton-miles, 33 per cent of the cargo ton-miles, and operates 54 per cent of the transports in scheduled operation. This performance is all the more remarkable when it is realized that by far the greatest portion of U. S. air transportation is done within the United States itself. That means that foreign airlines have the advantage of flying much greater distances, thereby piling up passenger-miles and ton-miles on fewer passengers and tons.

Trans-Polar Airline

Since the day of General Billy Mitchell we have been told that the North Pole held the key to future air attack but now comes the startling news that it may shortly become a scheduled airline operation. No dream, Scandinavian Airlines will make its first survey flight over the Polar route before the end of the year and has already completed plans for a regular Los Angeles-Copenhagen airline route as soon as the necessary diplomatic agreements can be obained. Purpose of the Polar route is to eliminate the Los Angeles-New York segment of the route a passenger from Los Angeles must fly to get to Europe. SAS, as it is known, says that it can cut about 2000 miles from the present West Coast-Europe airline distance, thereby saving time and money for

(*Turn to page* 120, *please*)

POWER-BRAKING

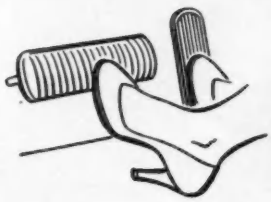
by KELSEY-HAYES

Assures Quicker, Easier, Safer Braking—





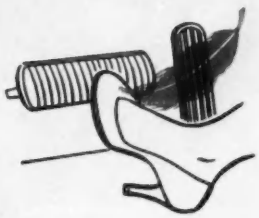
Now your heel rests naturally on the floor, while your toe does the braking!



Now you can brake with either right or left foot to save your energy!





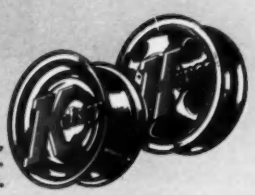


Now just a "feather-touch" of either toe on a low brake does the trick!

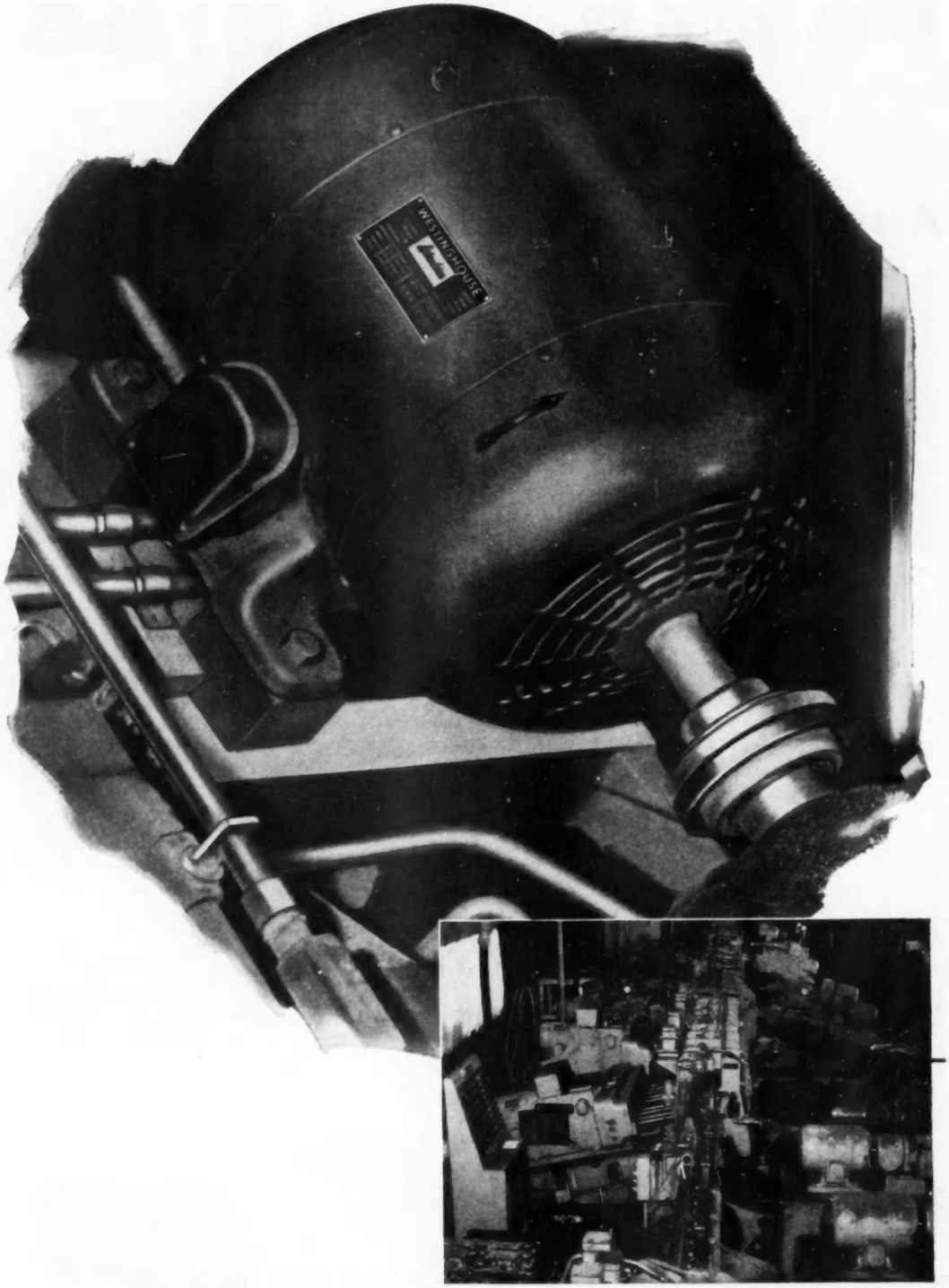
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PRODUCTS: Wheels—Hub and Drum Assemblies—Brakes—Vacuum Brake Power Units—for Passenger Cars, Trucks, Buses—Electric Brakes for House Trailers and Light Commercial Trailers—Wheels, Hubs, Axles, Parts for Farm Implements.
Plants: Kelsey-Hayes Plants in Michigan (4); McKeesport, Pa.; Los Angeles, Calif.; Davenport, Iowa; Windsor, Ont., Canada.



View of V-8 engine line, Studebaker plant, South Bend, Ind.

STUDEBAKER

chooses *Life-Line* motors for *dependability*

Studebaker V-8 engines get their start here. This machine, half a city block long, takes rough cast cylinder heads at one end, turns out completely machined and drilled finished ones at the other—at a rate of 150 finished cylinder heads per hour.

It's no accident that the motors that power this machine are Westinghouse Life-Lines. In fact, most motors that power the equipment at Studebaker are Westinghouse motors. This type of machine must meet one basic requirement—SHUTDOWN TIME IS OUT. One motor outage may cause the stoppage of the entire line. Thus, when motors were selected, Life-Lines were chosen because of their high degree of dependability.

This dependability is not based on any one feature. Rather, it is the sum of the parts—all based on advanced Westinghouse engineering. Pre-lubricated bearings, all-steel construction, superior insulation are typical of the factors that add up to the facts. You can't beat Life-Line performance. This dependability is yours at no extra cost.

Find out for yourself how Life-Line motors have solved problems for others. Send for a copy of "101 Life-Line Case Histories" B-4769. It's free. Your Westinghouse representative has one for you, or write Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Penna.

J-21658

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the A-B-C of M-S-T

A LWAYS MAKES POSSIBLE
B ETTER PRODUCTS AT LOWER
C OST



Michigan
Electric Resistance
WELDED
STEEL
TUBING

A Quality Product

ROUND
⅜" to 4" O. D. 9 to 22 gauge
SQUARE-RECTANGULAR
½" to 2" 20 gauge, 1" to 2¾", 14, 16, 18 gauge
Carbon 1010 to 1025

Michigan Tubing has uniform strength, weight, ductility, I. D. and O. D., wall thickness, machinability, and weldability. It can be flanged, expanded, tapered, swaged, beaded, upset, flattened, forged, spun closed, fluted, and rolled. Available in a wide range of sizes, shapes and wall thicknesses, prefabricated by Michigan or formed and machined in your own plant.

Plus Fabricating of our own tubing Michigan is interested ONLY IN THE FABRICATION OF Stainless steel, copper, brass and aluminum tubing.

Vacuum Cleaner Handle

An excellent example of how the use of welded steel tubing simplifies assembly of parts, cuts down costs, is the cleaner handle made by Michigan for manufacturers of vacuum cleaners.

The handle is shipped by Michigan ready for chrome finishing and assembly to the vacuum cleaner. Stampings for the cord holders are welded to the tubing, an elongated hole punched for the interior wire cord and tumbler switch. The surface finish of the cold rolled steel tubing, as processed by Michigan, is suitable for polishing and chrome plating.

No matter what you manufacture, Michigan engineers will be pleased to consult with you concerning an application of welded steel tubing to improve your product and lower production costs.



Consult us for engineering and technical help in the selection of tubing best suited to your needs.

RESISTANCE WELDED STEEL TUBING
Michigan STEEL TUBE PRODUCTS CO.
THE OLDEST NAME IN ELECTRIC

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AIRBRIEFS

(*Continued from page* 116)

the traveler between these two regions. The new route is made possible by the opening of the secret Thule, Greenland Air Force Base, and route operation is predicated entirely on obtaining permission for use of this base. Other stop on the route is Edmonton, Ontario. The route will be flown by regular Douglas DC-6B transports.

More Time

The time-taking nature of technical development work utterly belies the oft-spoken reference to "miracles in the jet age." As early as 1944 there were extensive discussions of various forms the aircraft gas turbine powerplant might take together with detailed charts outlining the performance advantages of each. For example, the use of two axial compressors, each driven by its own turbine, first discussed many years ago, is only now coming into prominence with the Pratt & Whitney J57 and the Armstrong Siddeley-Curtis-Wright Olympus jet engines, both in the 10,000-lb thrust class. The advantage of the dual compressor design lies in its ability to provide very high compression by taking the compressed air from the first stage and putting it through a second stage. The result is more thrust and a greatly reduced fuel consumption. Most widely discussed gas turbine form these many years, wholly in England, has been the "ducted fan" engine in which additional air is taken into the engine at a point near the rear to augment the flow. It is now revealed that the new Rolls-Royce Conway, which produces 11,000 lb of thrust, uses this ducted fan principle. The huge new engine will be used to power the de Havilland Comet series 4, a greatly enlarged jet transport in the 100-ton weight class. Thus, it has taken eight years to bring these ideas to reality, hardly the "miracle" attributed by the daily press to such announcements.

Jet Boost

Although its designers never dreamed of such possibility, the Curtiss C-46 Commando transport may soon be jet powered. The Flying Tiger Line, certificated freight carrier, has been experimenting with a small turbojet engine, the imported French Turbomeca Marbore, installed under the belly of a Commando. The

(*Turn to page* 124, *please*)



More lives than a Cat

It is typical of Spicer automotive power transmission units to keep alive and operating under years of heavy service. Spicer builds nearly a half-century of designing and manufacturing experience into its products. And backs these products with a service policy that assures long-range protection to the user. Spicer facilities are the most modern and efficient in the industry, and are available in their entirety to you.

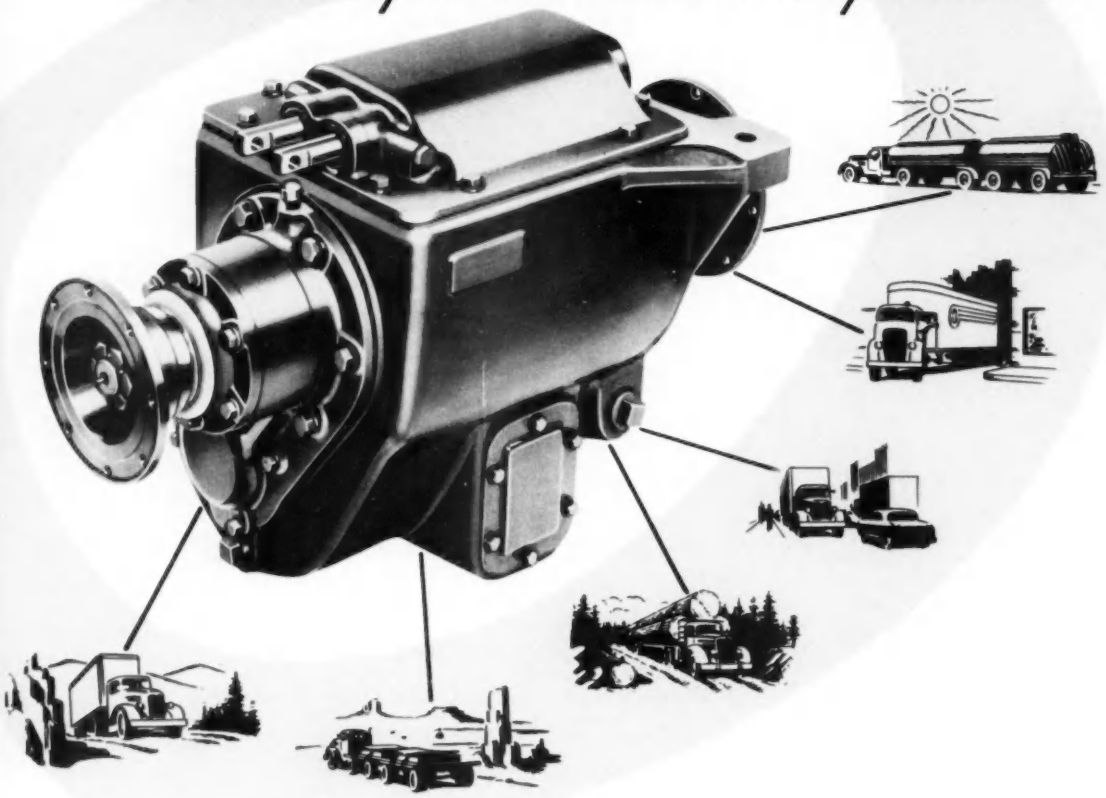


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Spicer Auxiliary Transmissions

reduce cost per-ton-mile on any terrain



Increase the earning power of your vehicles with Spicer Brown-Lipe 3-Speed Auxiliary Transmissions. They assure more pulling power in underdrive gears. They increase truck speed in overdrive gears, while reducing engine revolutions.

Every unit—motor, clutch, transmission, drive shaft, axle, brakes, tires—operates with less strain with a Spicer Brown-Lipe Auxiliary. Operators are assured less down time; fewer repairs; reduced gas, oil and tire bills; more consistent and bigger payload income.

Let Spicer engineers help reduce cost per ton mile in your vehicles with Spicer 3-Speed Auxiliary Transmissions.

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TRANSMISSIONS • UNIVERSAL JOINTS • BROWN-LIPE AND AUBURN CLUTCHES • FORGINGS • STAMPINGS
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POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES

The BUSINESS PULSE

(*Continued from page* 70)

Seasonable Gains in Nondurable Goods

A rising pace of activity is discernible also in nondurable-goods industries. Average daily cotton consumption during September, for example, was at the highest level in more than a year, on a seasonally adjusted basis. Usual autumn gains have been reported in clothing, jewelry, leather products and other consumer-goods industries as well. Paperboard production has soared appreciably above the disappointing levels maintained through the major part of this year in response to increased demand for packaging materials. The railway industry also is benefiting from the spurt in activity. Since early September, larger freight carloadings have placed a severe strain on the available supply of boxcars, especially in the Midwest where harvest movements have been heavy.

Both income and employment reflect the brisker pace of business. Personal income in August, the latest month for which data are available, rose to a seasonally adjusted annual rate of $267.1 billion. This compares with a previous high of $266.7 billion in June of this year and with a rate of $256.7 billion for August, 1951. This high dollar level, together with a declining tendency in the savings-to-income ratio, augurs well for retail trade.

Unemployed Labor at Minimum

Employment in nonagricultural establishments increased by more than half a million between mid-August and mid-September to 47.6 million, which represented a new high for the month. Farm employment also rose by about half a million as workers were hired to help with the harvesting. By the end of September the number of unemployed workers receiving State insurance benefits had dropped to a postwar low, and Secretary of Commerce Charles Sawyer estimated that no more than two per cent of the civilian labor force was idle, a level generally accepted as being close to the practical minimum.

No Inflationary Pressure

Despite the generally improved business situation, there has been no resumption of upward price tendencies. Indeed, at this moment the balance of forces seems to be mildly deflationary. The wholesale price index of the Guaranty Trust Co., which reflects movements in the prices of basic commodities, fell off by 1.7 per cent between mid-September and mid-October to the lowest level recorded since July, 1950. The only basic commodities currently showing firmness at high levels are those in heavy demand for mobilization uses, and even this group is diminishing in number, as witnessed by recent markdowns in the prices of such metals as lead and zinc. Prices of farm products declined by two per cent in the month ended September 15, and in the second half of September retail food prices registered a drop of one per cent, the sharpest decline since February.

Congress May Oppose Extension of Controls

Notwithstanding this rather general softness in prices, an effort will ap-

(*Turn to page* 126, *please*)

Test Cabinet

for SALT FOG CORROSION TESTS or HUMIDITY CORROSION TESTS

for Salt Fog Tests Meets the latest specifications of government and military authorities.

for Humidity Tests 95% to 100% relative humidity at room temperature to 125° F., temperature thermostatically controlled.

features

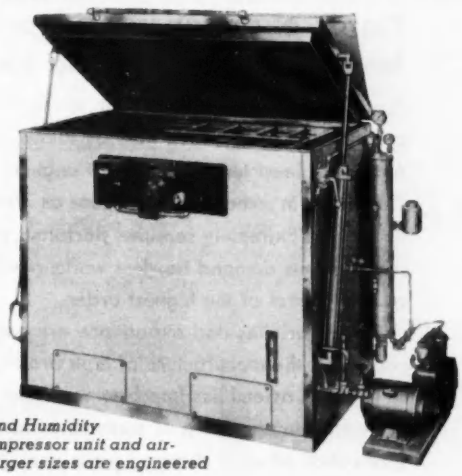
Lucite nozzle

Built-in heaters

Fully insulated

Exhaust flange at rear

Air-operated cover lifter (extra)



Standard size No. 1 INDUSTRIAL Salt Fog and Humidity Test Cabinet with air-compressor unit and air-operated cover lifter. Larger sizes are engineered to your requirements.

Write for complete information and recommendations

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Precision fuel control equipment, shown above, are vital mechanisms . . . built by Pierce to equip America's finest turbo-jet aircraft engines. Tolerances in some cases are close as 70-millionths of an inch. Extremely sensitive performance requirements demand flawless workmanship and quality control of the highest order.

Pierce facilities and experience are available to you . . . in the manufacture of high production small mechanical assemblies (machine work and assembly) . . . precision machining of mechanism castings and fabrication of small stamped parts and assemblies.

Your inquiry will receive immediate attention. Write to Chief Production Engineer,

The PIERCE GOVERNOR CO., Inc., Box 1000, Anderson, Indiana

"World's Most Experienced Governor Manufacturer"

AIRBRIEFS

(*Continued from page* 120)

little engine provides 880 lb of thrust, or about a 10 per cent increase ove the power of the two P&W Double Wasp engines used in the standard cargo plane. Purpose of the jet engine is not to provide any greater cargo-lifting ability to the big transport but may prove a valuable safety margin in getting the fully-loaded (48,000 lb) transport airborne under difficult (high altitude airports, hot, humid days) or emergency conditions. The installation adds 461 lb to t plane's weight and burns about 155 gal of gasoline per hour but it would be used only for short "boost" periods. Continental Motors Corp. has obtained U. S. production rights to the French engine and if the demand warrants will produce the engine for U. S. consumption.

BOOKS . . .

SPECIFICATIONS FOR COPPER AND COPPER-ALLOY WELDING RODS, published jointly by American Society for Testing Materials, 1916 Race St., Philadelphia, Pa., and American Welding Society, 33 W. 39th St., New York, N. Y. Price $0.40. These latest specifications for filler metal (ASTM Designation B 259 and AWS Designation A 5.7) cover copper and copper-alloy welding rods for use with oxy-acetylene, carbon arc, and inert-gas metal - arc (nonconsumable electrode) welding. The 12 classifications established by these specifications include copper, silicon bronze, phosphor bronze, copper-nickel, naval brass, manganese bronze, low-fuming bronze, nickel bronze, and aluminum bronze welding rods. Chemical composition, mechanical properties, and usability characteristics of each classification, with corresponding tests for verifying these properties, are specified. An appendix is included as an aid to users in selecting the best welding rod for their needs and using it in the most efficient way.

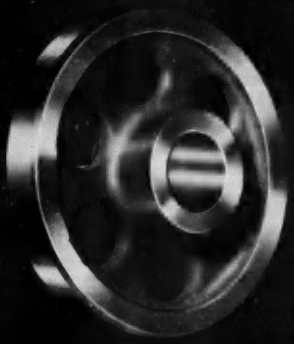
NOW IS THE TIME TO STEP OUT AND SELL, by W. E. Holler, published by The Dartnell Corp., 4660 Ravenswood Ave., Chicago 40, Ill. Price, $0.50. Written by a former Chevrolet general sales manager, this 80-page, pocket-size book contains invaluable sales tips for salesmen in any line, whether it be automobiles, machinery, stationery, or canned goods. Suggestions and advice are given on such subjects as: where to find prospects; the importance of training; doing the impossible; knowing people and liking them, etc.

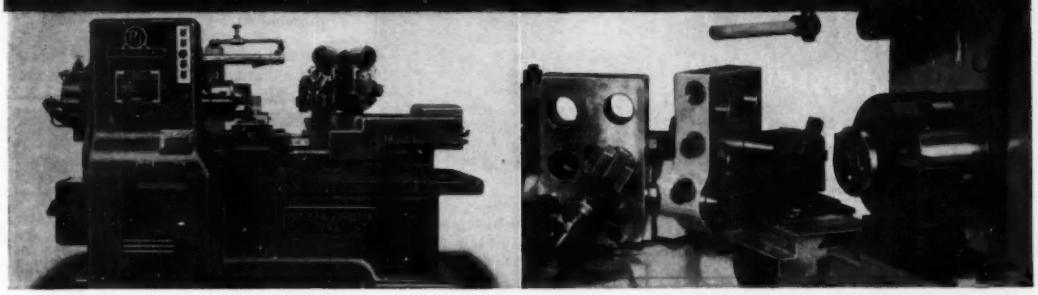
SELECTION AND USE OF ENGINE ANTIFREEZES, published by American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. Price, $0.40. The prime purpose of this publication is to provide practical information and advice on engine cooling system antifreezes and corrosion inhibitors. Other cooling system service products, such as cleaning compounds and stop-leaks, are also discussed. Various sections deal with classification of types, installation and servicing, testing, mixing of different types, re-use of solutions, etc.

ONE OF THESE PIECES

EVERY 1.84 MINUTES

POTTER & JOHNSTON 3U *SPEED-FLEX*





High output with high precision on difficult jobs is the rule, not the exception, with industry's outstanding production team, Potter & Johnston Automatic Turret Lathes plus P & J Tooling. A job like that shown above is a good example, not because it's unusual, but because it's the sort of work the 3U takes in its stride. All machining operations on these phosphor bronze drive worm wheels are completed in one automatic cycle. They include both inner and outer rim faces as well as the inner end of the hub. Tolerances on some surfaces are held to five ten-thousandths of an inch. One operator easily handles a battery of machines, providing divided labor costs. Production of small, precision parts in your plant can similarly be speeded up — made more efficient. Send now for your copy of Bulletin 145 that fully illustrates and describes the Potter & Johnston 3U Speed-Flex Automatic. Ask P&J Tooling Engineers to make a time and cost estimate for your difficult jobs. They will work out the best possible tooling for better quality, lower costs and fewer rejects — and there is no obligation.

Precision Production Tooling for over 50 years

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BUSINESS PULSE

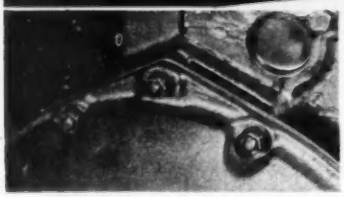
(Continued from page 123)

...be made to extend price and wage controls beyond April 30 of next year when the present control authority is scheduled to expire. Defense Mobilizer Henry F. Fowler has recommended the enactment of "stand-by" price and wage control legislation to be used if and when inflationary pressures reappear. This recommendation has been seconded by Economic Stabilizer Roger Putnam, who says that he has already instructed wage, price and rent control agencies to prepare tentative recommendations for study. In view of the current price softness, together with widespread dissatisfaction caused by the workings of the control law in the steel and coal disputes, it seems certain that these endeavors to prolong the period of control authority will meet with strong Congressional opposition.

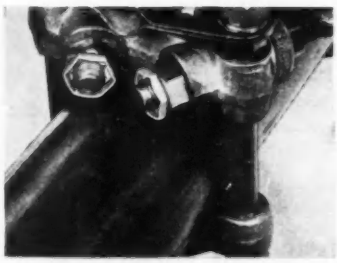
In addition to advising the enactment of "stand-by" legislation for controlling prices and wages, Mr. Fowler has also gone on record as favoring continuance of some form of production controls beyond the expiration of the Defense Production Act next June 30. Noting that the greater part of the defense program still lies ahead, Mr. Fowler said that in his opinion it would be necessary to continue some form of priority and allocation control and also to retain special lending powers and rapid-amortization authority. Moreover, he believes that it will not be feasible to terminate the Controlled Materials Plan for rationing steel, aluminum, and copper before July 1, 1953, hinting that the Government may decide to take advantage of the Nation's greater industrial capacity by raising defense objectives. The Defense Mobilizer is known to favor increased appropriations in the next budget, but other officials have been restrained in commenting on this possibility.

Absolute security for bolted assemblies —at low cost!





PALNUTS lock regular nuts holding transmission housing to engine.



PALNUTS lock regular nuts on support for drive shaft tube.

WHEREVER a bolted assembly must stay tight in service, add a Regular Type PALNUT Locknut on top of the ordinary nut. Here are the advantages:

- Holds ordinary nut and bolt to original tightness, under severest vibration
- Easy, fast assembly with hand or power drivers
- Ordinary nut and PALNUT cost less than most other locknuts
- Requires no more space
- Unaffected by heat or oil
- No damage to nut or nut seat
- May be removed and re-used

The unfailing security of PALNUT double-locking action is proved by the increasing use on connecting rods, brake parts, exhaust manifolds, body hold down, front and rear engine mountings, etc. Send details of your assembly for samples and data.

Note: This ad describes the Regular Type PALNUT used for heavy loads and vibration. Many other types available for use as load-carrying nuts for low-cost assembly of moulding, medallions, nameplates, etc.

Write for samples and data on Regular Type PALNUT Lock Nuts

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Detroit: 730 West Eight Mile Road



PALNUT
LOCK NUTS

BOOKS . . .

EXPLORING AUTOMECHANICS, by Harold T. Glenn, published by Chas. A. Bennett Co., Inc., 237 No. Monroe St., Peoria, Ill. Price, $3.96. Written to fill a great need for an organized procedure for teaching "exploratory" automotive classes, this book follows the sound "learn-by-doing" method. Each chapter contains a short preview of the problems to be studied in the section, a reading assignment, questions based on the reading and classroom instruction, and detailed instructions for laboratory work that enable the student to put into worthwhile practice the fundamentals taught in the text and by his teacher. For example, the chapter on "Understanding the Operating Principles Involved in an Automobile Engine," lists the step-by-step procedure for replacing cylinder head, manifold, and oil pan gaskets, changing engine oil, lubricating the engine units, inspecting an oil pump, replacing a fan belt, repacking a water pump, testing thermostats, removing, replacing, grinding, and refacing valves, etc.

ELECTRON TUBES IN INDUSTRY, Third Edition; by Keith Henney and James D. Fahnestock, published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. Price, $6.00. Completely rewritten to make it a thoroughly up-to-date and useful manual, this streamlined guide to the use of the electron tube in industry recites what the tube is doing to make processes simpler, cheaper, and safer—how it can be applied in developing new methods of manufacture. The fundamentals presented will enable the engineer and technician to know what can be expected of electronic devices, especially their limitations and new applications. Practical, tried, and tested circuits are used to illustrate the principles described. Clearly explained are the operational fundamentals of the components, tubes, and circuits applied to industrial problems of control, measurement, electronic heating, motor speed control, and counting, sorting, and grading. Amplifiers, thyratrons, phototubes, and cathode-ray tubes and their many applications are covered.

Wagner Air Brakes

ARE AVAILABLE IN

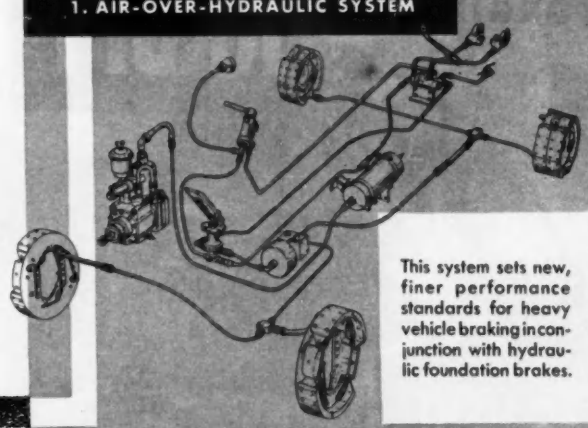
1. Air-Over-Hydraulic

or

2. Straight Air

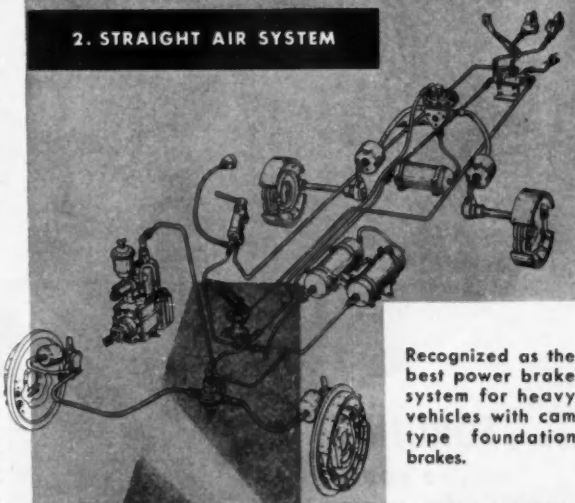
SYSTEMS

1. AIR-OVER-HYDRAULIC SYSTEM



This system sets new, finer performance standards for heavy vehicle braking in conjunction with hydraulic foundation brakes.

2. STRAIGHT AIR SYSTEM



Recognized as the best power brake system for heavy vehicles with cam type foundation brakes.

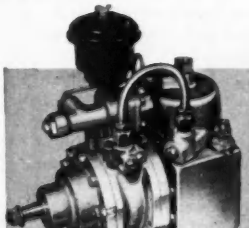
Used as original equipment by truck and bus manufacturers!

These two types of Wagner Air Brake systems offer many operating advantages. The STRAIGHT AIR system for cam type foundation brakes provides plenty of controllable power and the AIR OVER HYDRAULIC system combines many advantages that result in a material reduction in maintenance and operating costs. These Wagner systems meet the requirements of all types of vehicles and assure highest braking efficiency.

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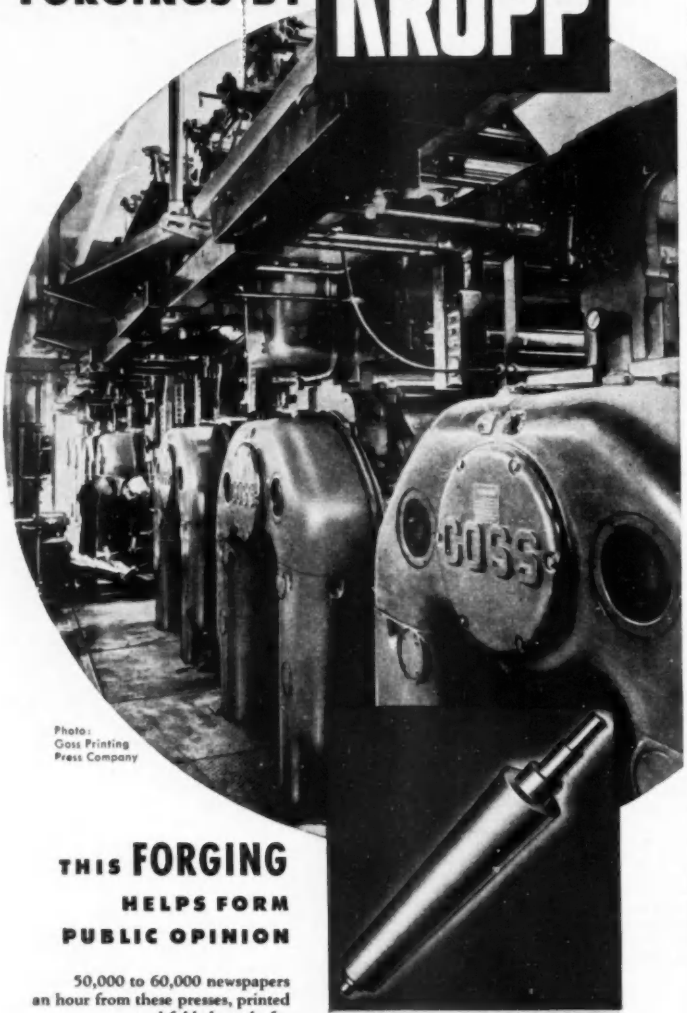


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Metal Show Highlights

(*Continued from page* 47)

for the 1150 F treatment and 28 to 30 Rockwell C for the 1050 F treatment.

Since it was impossible to temper immediately the as-quenched bars, they were given the 400 F stress relieving treatment. It was felt that this treatment would prohibit cracking. These treatments are summarized in Table I.

Standard V-notch Charpy impact bars were machined according to ASTM E23-47T Type A specification and given the same heat treatments as outlined for the fatigue bars. These were broken at room temperature (75 F) and at −30 F with the results shown in Table II. Although the complete transition curve was not determined from a ductile to brittle fracture, it can be seen from Table II that the transition temperature for the first heat treatment was below −30 F, for the second it was between 75 F and −30 F, while for the third it appears to be near room temperature.

Metallographic examination of these bars in the as-quenched condition showed the percentage of martensite present to be 98 per cent.

After rough machining and heat treating, the fatigue bars were finished, and the polished bars were next ground in a longitudinal direction, followed by a superfinishing operation likewise moving in a longitudinal direction with the axis of the sample. These finishing operations produced a surface of 0 to 2.0 microinches.

Two sets of 10 each polished fatigue specimens were finished from heat treatment No. 1, along with two sets of 10 each of the notched variety. Ten polished and 10 notched bars were finished from heat treatment No. 2, and 10 polished and 10 notched from heat treatment No. 3.

The endurance limit for both the polished and notched bars was determined at room temperature and is shown in Table III. Subsequent to these tests the machines were moved into the cold testing laboratory at −35 F. Several mechanical changes had to be incorporated in the machines such as using lighter oil, reducing the speed to about 3000 rpm and other minor changes. Polished and notched bars were run at this temperature with results shown in Table III.

(*Turn to page* 132, *please*)



"Made for Each Other!"

SERVICE PISTON RING SETS BY-MUSKEGON ARE DESIGNED FOR A SPECIFIC ENGINE ONLY!

This set of service piston rings was designed not just for *any* engine—but for one particular engine only!

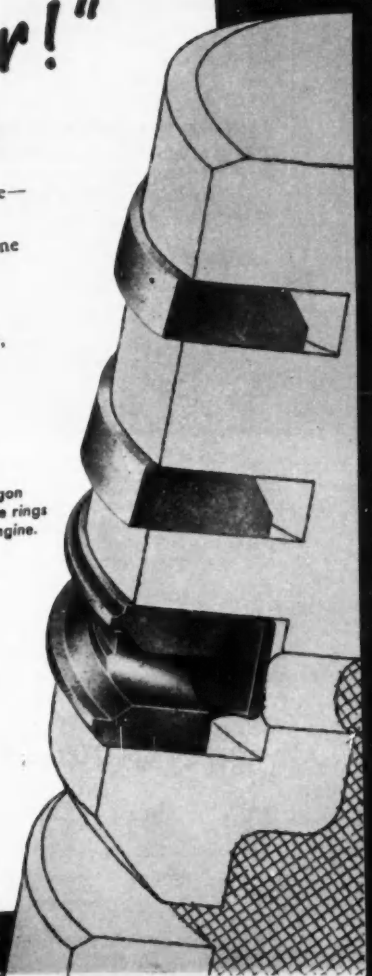
Thus, like the original rings, these service rings and their engine have been truly "made for each other" and will insure the maximum of power and economy.

Rings like these are the end result of close collaboration between the car manufacturer and Muskegon Piston Ring Company, whose facilities encompass every service from engineering counsel to complete packaging.

These *Factory Approved* and *Factory Engineered* Service Piston Ring Sets are available only through car dealers and other authorized service outlets.

Engine maker* and Muskegon engineered this set of service rings for a single, specific engine.



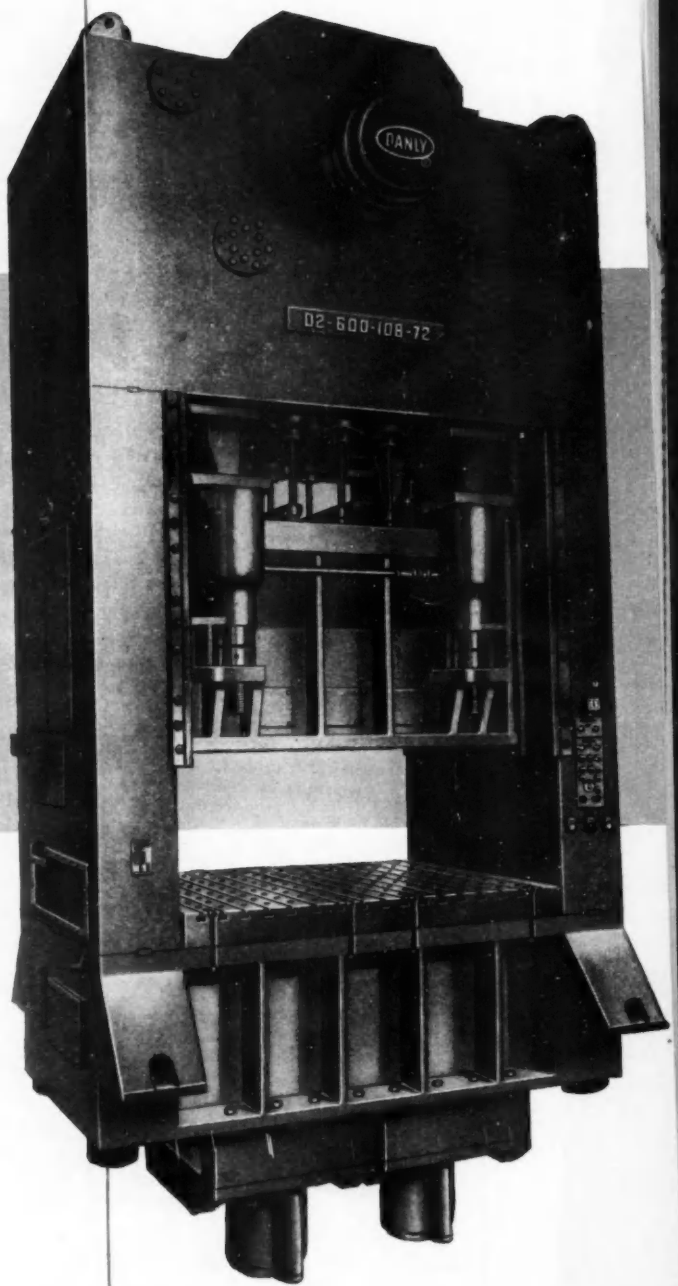


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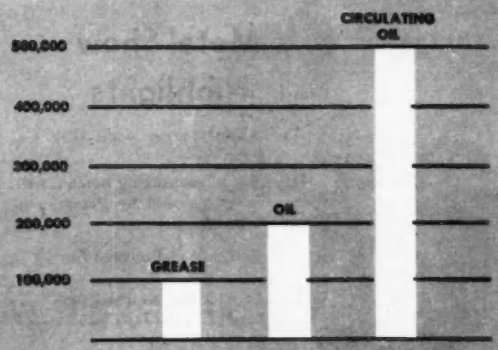
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check your maintenance records!

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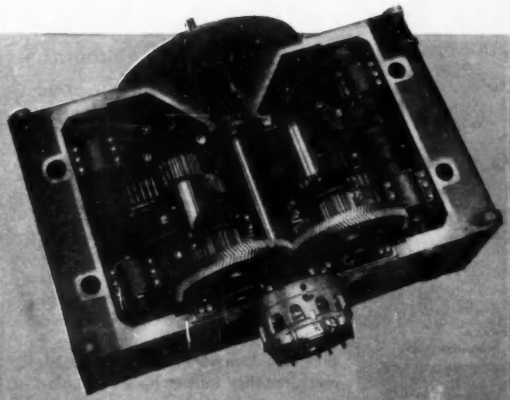
CIRCULATING OIL GIVES GREATER PROTECTION

Chart showing superiority of circulating oil lubrication for anti-friction bearings. Values at left represent bore of bearing in millimeters multiplied by speed in rpm . . . an accepted method for expressing limits of efficient bearing operation.

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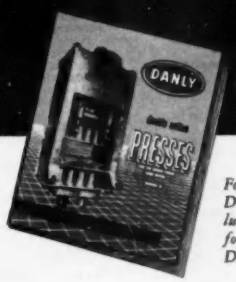


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Metal Show Highlights

(*Continued from page* 128)

A method of measuring notch sensitivity ("q") proposed by Peterson is given by the equation:

$$q = \frac{\dfrac{\text{Endurance Limit of Polished Bar}}{\text{Endurance Limit of Notched Bar}} - 1}{K_t - 1}$$

where K_t is the stress concentration predicted from theory. From such a relationship the notch sensitivity factor was found for these materials as shown in Table IV.

TABLE IV

NOTCH SENSITIVITY FACTORS

Treatment	Temp., F	q
Nonembrittled (Heat Treat No. 1)	75	0.9
Embrittled (Heat Treat No. 3)	75	0.9
Nonembrittled (Heat Treat No. 1)	−35	1.0
Embrittled (Heat Treat No. 2)	−35	0.9

From these tests it appears that the metallurgical phenomenon of temper brittleness has no effect on the endurance limit of the steel tested. Thus, even at cold temperatures, although the Charpy impact value decreased, the endurance limit remained unchanged. Therefore, in engineering applications where a temper-embrittled steel is used, it is believed that the endurance limit of the part will be unaffected, even at temperatures below the transition temperature.

Correlation of Machinability with Inclusion Characteristics in Resulphurized Bessemer Steels

By Lawrence H. Van Vlack
United States Steel Co.

IT has been noted that steels of higher silicon contents, which possess lower machinability index ratings, have more "plastic"-type inclusions. Conversely, steels with high machinability indices have "globular"-type inclusions. In summarizing a large number of machinability data

(*Turn to page* 134, *please*)


How the casting
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$42,000,000!
Only a few engine builders realized back in 1932 that Campbell, Wyant and Cannon really had something in the *cast* camshaft. Since that time, many others found that CWC's casting process could make important cost reductions and together they saved over $42,000,000. Together they bought from CWC 33,000,000 *cast* camshafts!
CWC *cast* camshafts are *produced* at a lower cost! Made of electric furnace alloyed metal, they require *less* machining and *easier* machining. They permit unrestricted engine design—positive control of Brinnell specifications—eliminate heat treating—and resist corrosion and wear. Regardless of the number of engines you make—the same proportionate savings can be yours with CWC *cast* camshafts!
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Since 1908
METALLURGICAL ENGINEERING provides unlimited possibilities in product design
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Save labor . . . speed up production with T-J Rivitors and Clinchors adaptable to a wide range of assembly jobs today . . . in aircraft, automotive, farm machinery, stampings of all kinds!

T-J Clinchors set clinch nuts 3 to 5 times faster! Fully automatic . . . controlled by a single foot pedal. Available in Underfeed and Gravity feed models, throat depths 8" to 36".

T-J Rivitors automatically feed and set solid rivets . . . with high production! Electrically-powered Rivitor sets 1/16" to ¼" diam. solid steel rivets up to ⅞" long. Air-powered Rivitor sets aluminum alloy rivets up to ¼" diam. or steel rivets up to ⅛" diam. and up to ¾" long. Throat depths 8" to 36"

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Metal Show Highlights

(*Continued from page* 132)

from commercial blows of B-1113 steel, it was concluded that optimum machinability was obtained when the inclusions were predominantly globular in shape. The inclusion shapes were rated as "plastic" or "globular" by making a comparison of those observed in a microsection with standardized charts. Where necessary, the shapes were further divided as "mostly globular, some plastic" or "mostly plastic, some globular."

An effort is made in this study to establish more firmly the relationship between the inclusion's characteristics and machinability of resulphurized steels. A more quantitative measure of shape, the length/width ratio, was used. Preliminary work also indicated that not only the shape but also the number of the inclusions was related to the silicon content and to the machinability. The number of inclusions was more easily determined than the shape, and was subject to fewer statistical errors. Therefore, that variable was also investigated.

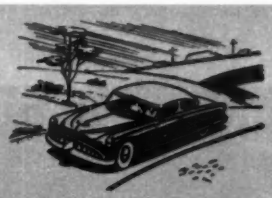
Samples used for inclusion determinations were those previously used for machinability studies. The steels in one series were B-1112 steels which had had varying amounts of oxygen and silicon added. The ingot and billet identifications were maintained during rolling. A second series was from bars selected randomly from B-1113 heats for machinability tests.

The metal analyses used were the check analyses on the bars obtained for the machinability index ratings. Oxygen was determined by vacuum fusion analyses on samples from the same bars or from the samples used for microscopic examination. The data are summarized in Table I, page 138.

The machinability index was measured by the constant-pressure lathe test. The ratings for the steels indicate the relative cutting speeds when a constant pressure was applied to the tool. They are to be compared with an index of 100 for a standard B-1111 steel. The ratings for the controlled series were made at Battelle Memorial Institute. Those on the randomly selected samples were made at the Duquesne Works and the Research and Development Laboratory of the United States Steel Co.

The length/width ratios of inclu-

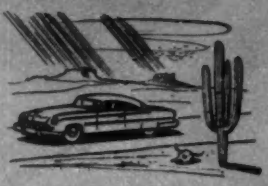
(*Turn to page* 138, *please*)



No Missing on Turns



Instant Starts on Hills



No Percolation

Smooth Performer

None but a true concentric carburetor can produce the constant fuel flow needed for smooth engine performance during fast stops and starts and during sharp turns. The Holley Centri-Flo, a true concentric carburetor, is now in use on many of the nation's most outstanding automobiles.

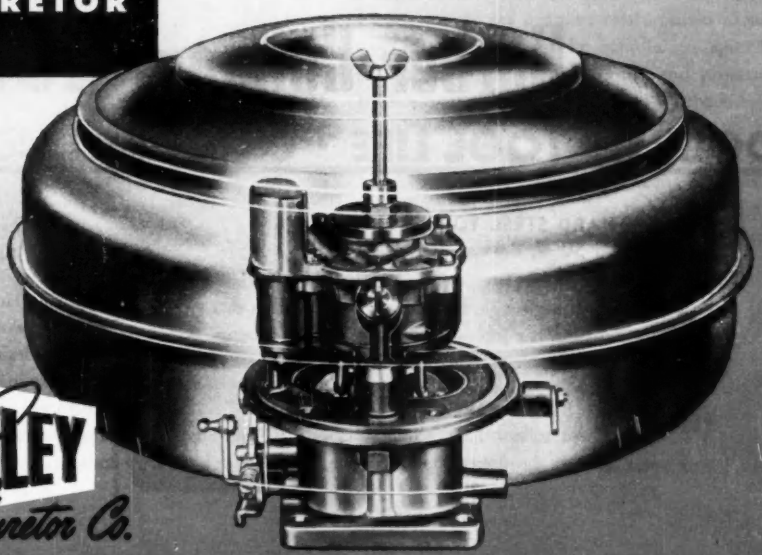
True concentric carburetor design requires the location of the main jets and power valve in the center and bottom of the float chamber. Also the float chamber itself must be centrally located. By keeping the discharge point centrally located, there is always an adequate fuel level regardless of the angle of the engine.

The Centri-Flo prevents percolation because of its fully insulated fuel bowl.

The Centri-Flo is the Holley model 1901. It is designed for engines of 110 to 180 H.P.

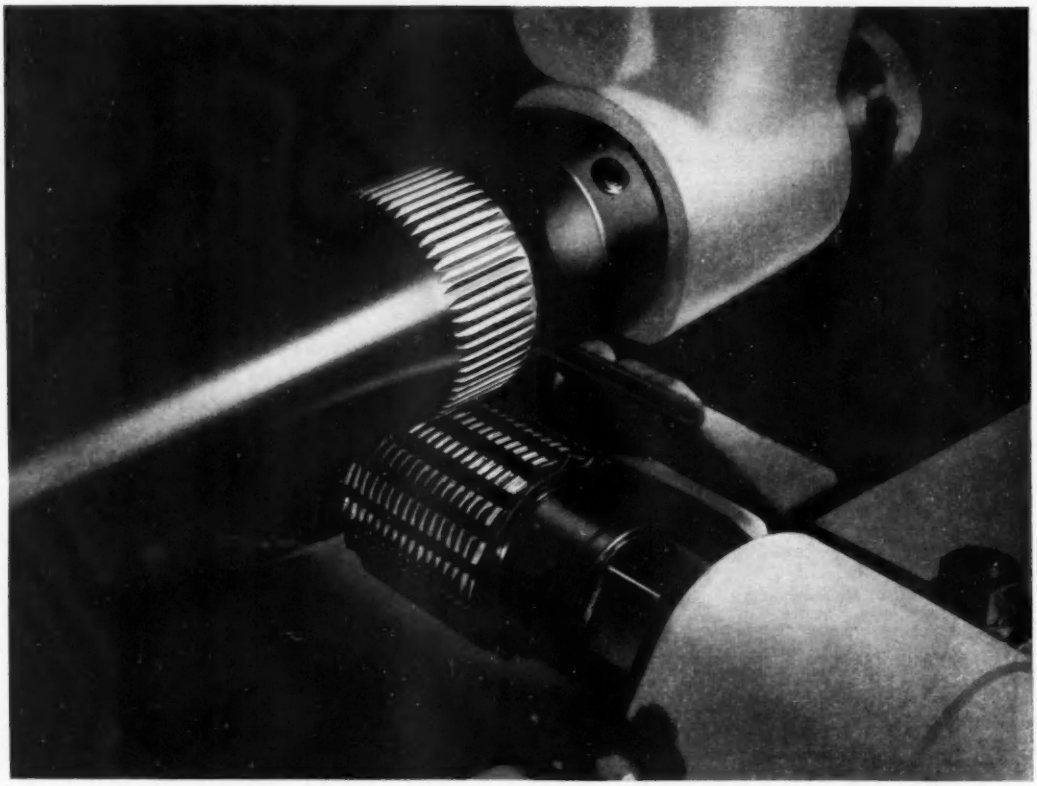
THE HOLLEY CENTRI-FLO CARBURETOR

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Barber-Colman HOBBING

DOUBLES TOOL LIFE · CUTS PRODUCTION TIME

HARD STEEL TORSION BARS, 45-50 R. C.

Hobbing tough, hard materials — such as this torsion bar job — presents no special production problems when you use the Engineered Hobbing approach.

These torsion bars, 45-50 Rockwell "C", approach the upper limit of machineability for hobbing. Structure and toughness of the material caused hob teeth to wear rapidly.

Barber-Colman Hobbing Engineers worked closely with production officials in this plant to produce the desired results on this job. Substantial tool savings, increased tool life, and better production time resulted. Total hob life has increased from approximately 600 to over 1200 ends.

BUILDERS OF PRECISION GEAR

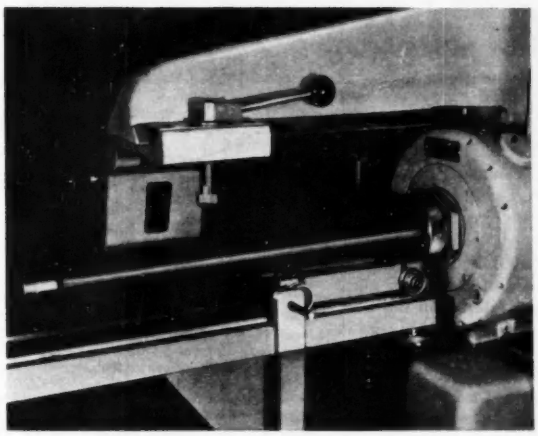
TOOL COSTS REDUCED WITH CLASS C ACCURATE UNGROUND HOBS

Barber-Colman engineers recommended 4-thread Class C Accurate Unground Hobs and automatic hob shifting to increase tool life and production in this hard material. Results showed an average increase from 65 to 120 hobbed ends per hob sharpening. The use of unground hobs has reduced tool cost considerably. Cutting time is 5 minutes per end, the length of cut being $1\frac{1}{8}$".

The form on the hob is a 48° 44′ pressure angle serration with a full radius at the top of the tooth. The hob is non-topping. Climb hobbing allows the hob tooth to start its cut in metal which has had no opportunity to be work hardened.



COMBINED ENGINEERING OF HOBS, TOOLING AND MACHINES PRODUCES BENEFITS



Results obtained on this hobbing job show the benefits possible when hobs, machines and tooling are combined through proper engineering to meet the specific problems of the job.

New No. 16-16 Hobbing Machines are used, equipped with 30" rear overhanging center bracket. Bars are loaded from the rear of the spindle, where the operator easily pushes them from a conveyor into the spindle. A special steadyrest bracket guides the bar and protects the hob while loading. Work change time is $1\frac{1}{2}$ minutes.

You, too, can simplify your hobbing problems by consulting Barber-Colman engineers. Why not contact them today for an evaluation of your hobbing methods.

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HOBS AND MACHINES SINCE 1911

(*Continued from page* 134)

sions were determined with the aid of an ocular micrometer on the microscope. The maximum width and length of each inclusion were used. The L/W value for each steel sample is the average of the L/W ratios of at least 25 inclusions selected randomly across the microsection of the steel. To insure randomness in the selection of inclusions for shape measurements, the microscope stage was moved ahead a predetermined distance *without* observation. Then with observation, the sample was moved forward to the next following inclusion. That inclusion was measured and the process repeated. The increment of distance was chosen so that the full width of the microsection was traversed.

TABLE I

MACHINABILITY DATA—B-1112 CONTROLLED HEAT

Ingot-Billet	Chemical Analyses—% C	Mn	P	S	Si	O	Incl./mm²	L/W	Mach. Index	Remarks
1- 5	0.06	0.94	0.10	0.20	0.009	0.011	82	3.7	185	O_2 added
1-10	0.05	0.99	0.09	0.19	0.025	0.028	112	4.1	139	O_2 added
2- 5	0.05	0.91	0.09	0.20	0.007	0.014	96	3.2	181	Roll scale
2-10	0.06	0.95	0.09	0.19	0.018	0.025	147	3.6	135	Added
3- 4	0.06	0.95	0.10	0.20	0.009	0.010	96	2.7	184	No additions
3-10	0.07	0.98	0.09	0.19	0.018	0.027	112	3.9	157	No additions
4- 3	0.06	0.95	0.09	0.20	0.013	0.018	143	8.9	182	Si added
4-10	0.06	0.95	0.09	0.18	0.025	0.019	153	5.1	121	Si added
5- 5	0.06	0.94	0.10	0.20	0.018	0.017	151	5.5	173	Si added
6- 5	0.06	0.95	0.09	0.20	0.025	n.d.	190	7.2	161	Si added
7- 5	0.06	0.94	0.09	0.20	0.029	0.015	190	5.8	145	Si added
8- 5	0.06	0.94	0.09	0.20	0.037	n.d.	200	10.2	143	Si added
9- 5	0.07	0.94	0.09	0.20	0.044	0.017	258	13.4	132	Si added
10- 5	0.07	0.94	0.09	0.20	0.009	0.012	118	5.6	185	No additions

The number of inclusions is related to the size of the inclusions for a steel of any given sulphur content, providing that there is not a change in inclusion volume resulting from major changes in inclusion composition. The number was determined by counting the inclusions observed microscopically in traverses across the full width of the microsection. The total number counted was then converted to "inclusion per square millimeter" for an index of inclusion size.

The dependence of the machinability upon silicon content is shown in Fig. 1. All of these data are from middle positions in successive ingots in one heat. Thus, they represent a series of controlled tests in which all of the variables except silicon have been held essentially constant. Fig. 2 shows the relationship of inclusion shape to the machinability index. As pointed out earlier, the inclusions of smaller L/W ratios accompanied the lower silicon, more easily machined steels. The de-

(*Turn to page* 141, *please*)

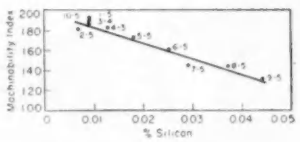
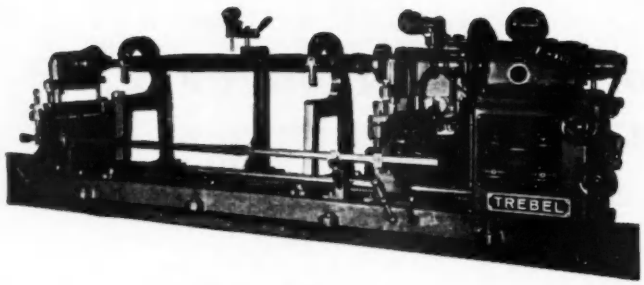


Fig. 1—The Variation of Machinability With Silicon Content (2).

Ingot 1—No silicon added; Ingot 2—No silicon added; Ingot 3—No silicon added; Ingot 4—0.006% silicon added; Ingot 5—0.010% silicon added; Ingot 6—0.013% silicon added; Ingot 7—0.021% silicon added; Ingot 8—0.031% silicon added; Ingot 9—0.042% silicon added; Ingot 10—No silicon added. (Ingot and billet number indicated. Ten billets per ingot.)



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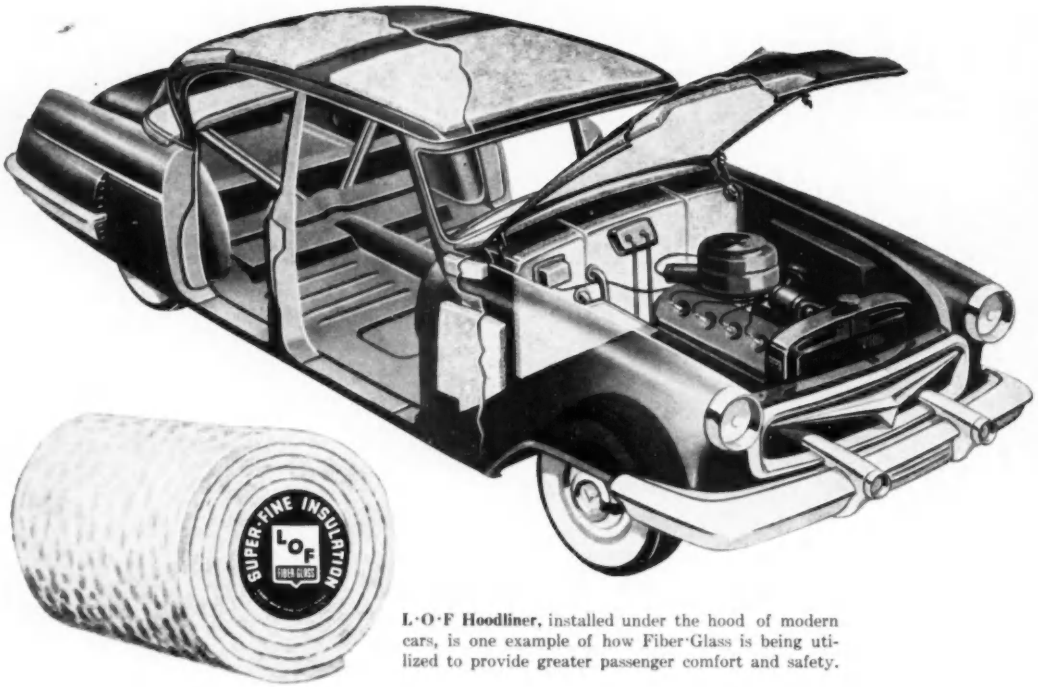
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(*Continued from page* 138)

pendence of the machinability index upon inclusion size is shown in Fig. 3. Since the silicon content was the only factor varied intentionally, it must be

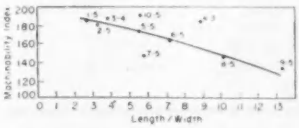


Fig. 2—The Variation of Machinability With Inclusion Shape. (Same steels as in Fig. 1.)

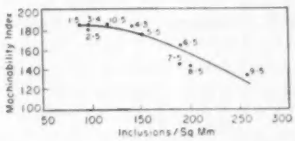


Fig. 3—The Variation of Machinability With Inclusion Count. All of the steels had 0.20% sulphur. Thus the inclusion count is an inverse index of the inclusion size. (Same steels as in Fig. 1.)

concluded that the changes in inclusion shape and size were dependent upon the silicon. Good correlations of size and shape with silicon content were obtained. Also, the steels with the longer, "plastic" inclusions had more inclusions. Very probably both of these variables are dependent upon the same factors.

Accelerated Strain Aging of Commercial Sheet Steels

By L. R. Shoenberger and E. J. Paliwoda

Jones & Laughlin Steel Corp.

THE strain aging of sheet and strip after skin rolling has long been recognized as an important factor in the ultimate drawability of steel. Skin rolling is performed primarily to eliminate the yield point which is associated with stretcher strain markings during forming. Changes that occur in the period between skin rolling by the producer and fabrication by the consumer result in yield point return and embrittlement of the steel.

A few steels have been developed in which strain aging is effectively inhibited, but only two — aluminum-killed and vanadium-rimmed — are commercially important. Since both are more expensive to produce, control of strain aging of ordinary

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rimmed steels and development of a low-cost stabilized steel are desirable. Present information regarding the strain aging of skin-rolled steels is limited, however, and there is no satisfactory means for measuring the actual strain aging characteristics of temper-rolled material.

Natural aging of a number of rimmed, aluminum-killed, and vanadium-rimmed steels was measured by means of hardness and tensile tests. Chemical composition limits of these steels are shown in Table I.

Samples were selected from center portions of skin-rolled sheets, and mechanical properties were determined within eight hours after rolling. Subsequently, 10 to 20 hardness impressions and a tensile test were made periodically for six months as the steels strain-aged at room temperature (65 to 85 F or 20 to 30 C).

TABLE I

CHEMICAL COMPOSITION LIMITS

Type	C	Mn	P	S	Si	Al	V
Rimmed	0.03/0.06	0.25/0.37	0.004/0.009	0.010/0.037	0.01	0.003/0.006	.....
V-Rimmed	0.04/0.05	0.29/0.35	0.006/0.011	0.025/0.026	0.01	0.003/0.004	0.022/0.037
Al-Killed	0.05/0.06	0.25/0.29	0.003/0.010	0.029/0.038	0.02/0.04	0.021/0.038	.....

Type	Total Nitrogen	Soluble Nitrogen	Uncombined Nitrogen*
Rimmed	0.003/0.005	0.003/0.005	0.003/0.005
V-Rimmed	0.004/0.005	0.001/0.003	0.001/0.003
Al-Killed	0.005/0.007	0.005/0.007	0.0002/0.0024

* Nitrogen not combined as AlN or VN.

Considerable variations in the aging characteristics of rimmed and stabilized steels were noted, and attempts were made to ascertain the significant variables. Chemical composition, ferritic grain size, and degree of skin rolling were considered to be important factors. However, deviations in chemical composition of the ordinary rimmed steels tested did not appear to influence strain aging behavior.

Ferrite grain size measurements were made by the intercept method (x200); and where grain size differences existed between rim and core, consideration was given to the proportions in deriving an average intercept grain size. The range of average grain sizes in the rimmed steels varied from 4.5 to 7 by ASTM standards.

The general hardness levels of rimmed steels before and after aging proved to be mainly a function of ferrite grain size. Smaller-grained steels were relatively harder, both in the freshly skin-rolled and the aged conditions.

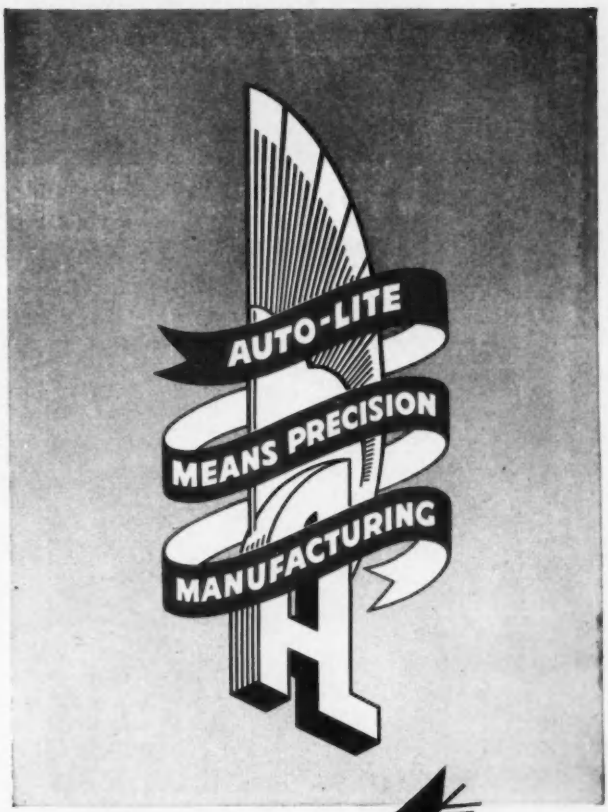
The change in hardness during six months of natural aging was associated with the degree of skin rolling. In this work, the amount of age hardening increased with temper rolling to 0.8 per cent. Skin rolling 0.8 to 1.8 per cent did not appear to influence further the degree of age hardening. Faster rates of age hardening were noted in rimmed steels that were temper-rolled more than 0.8 per cent.

Greater amounts of yield elongation after six months aging were observed in finer-grained material, which is in agreement with findings of other investigators. The speed of tensile testing, in this instance, was 0.05 in. per min. and the yield elongation value employed is for a standard two-in. gage length.

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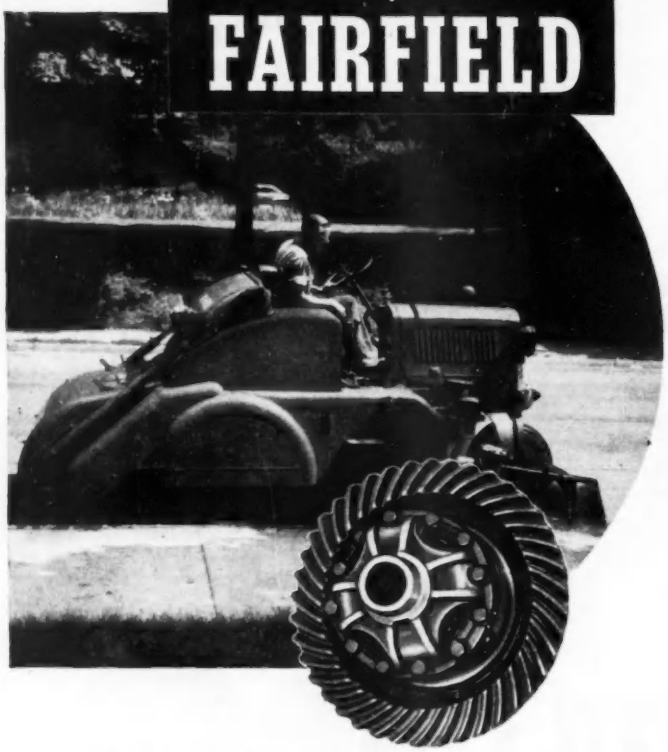
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return were observed in ordinary rimmed steels having small ferrite grains. These steels were skin-rolled from 0.6 to 1.8 per cent. Data for several samples of the same heat, which were skin-rolled various amounts, suggest a minor retarding action by the more severe skin rolling operations, but results are not conclusive.

A yield point returned for all rimmed steels within three days after skin rolling. Yield point increased markedly during aging in a manner similar to yield elongation return. An increase of about 1800 psi in yield point was accompanied by a return of 0.010 in. yield elongation. Higher yield points and tensile strengths were related to finer-grained material. Tensile strength of the steels was comparatively unaffected by strain aging, the increase in strength seldom exceeding 2500 psi after six months of aging.

Attempts to relate elongation data with mechanical and chemical characteristics of the steels were not completely successful.

Both ferrite grain size and degree of skin rolling are probably significant in the production of stabilized sheet and strip steels, but nitrogen assumes an important position not found in rimmed steels. Large portions of the nitrogen contents of stabilized material are combined as aluminum or vanadium nitrides by suitable alloy additions and heat treatment. The remainder of the nitrogen in aluminum-killed and vanadium-rimmed steels is arbitrarily designated as active or uncombined nitrogen, and is usually low. These active nitrogen contents varied from 0.0002 to 0.0024 per cent in steels employed in this investigation.

Since nitrogen has been regarded as one of the possible causes of aging, efforts were made to ascertain the significance of uncombined nitrogen in stabilized steels. Due to the apparent interdependence of a number of factors in strain aging, no clear-cut solution was obtained. For example, higher hardness (freshly skin-rolled and strain-aged) was observed for stabilized materials with relatively high, active nitrogen contents. The influence of grain size on the hardness of this material could not be determined due to differences in grain shape (elongated versus equiaxed). Degree of age hardening could not be correlated with uncombined nitrogen in this work.

An aging test was developed, utilizing gradient heat treated samples and employing time-temperature relationships to obtain varying degrees of accelerated aging. These time-temper-

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ature relationships were correlated with aging at room temperature. By this means, accurate predictions can be made of the age hardening characteristics of freshly skin-rolled sheet and strip steels.

The rate and severity of yield return can be predicted by determining the aging temperature necessary to produce strain waves in gradient-treated samples as they are stretched in a tensile machine. The temperature that initiates the strain wave is a measure of the rate and severity of yield point return.

New Defense Facilities

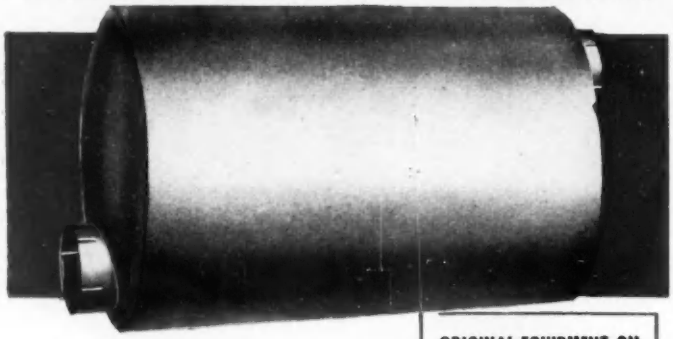
SUPPLEMENTING the list of Certificates of Necessity issued up to September 24 authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the November 1 issue, page 134, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Defense Production Administration, Sept. 24 to Oct. 22.

Included in this latest tabulation, 14,177 new or expanded defense facilities of all types have been authorized for rapid tax write-off, the total amount eligible for amortization being $22,983,285,000. These figures are exclusive of cases that are up for later review but included in this list —in these cases no dollar amount is listed. The figure appearing in parentheses is the percentage authorized for actual fast tax write-off.

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(*Turn to page* 150, *please*)



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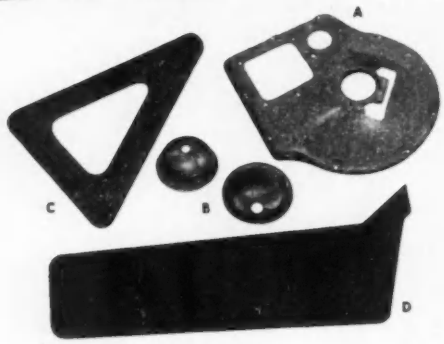
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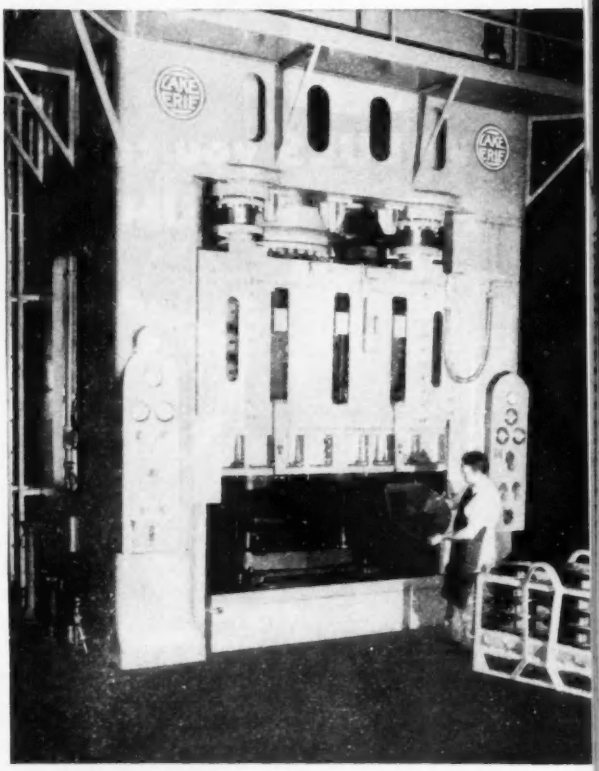
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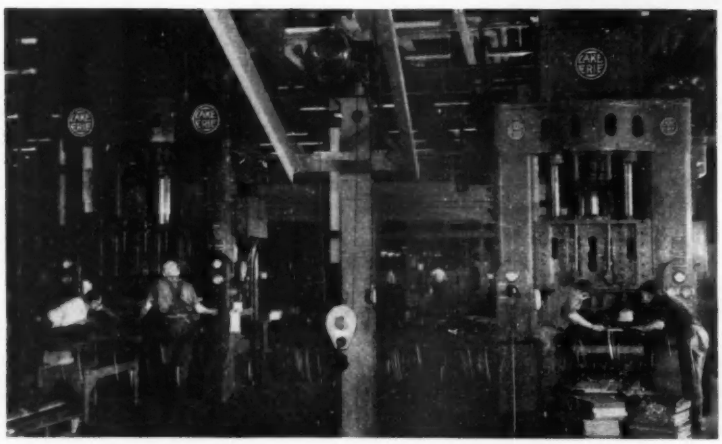
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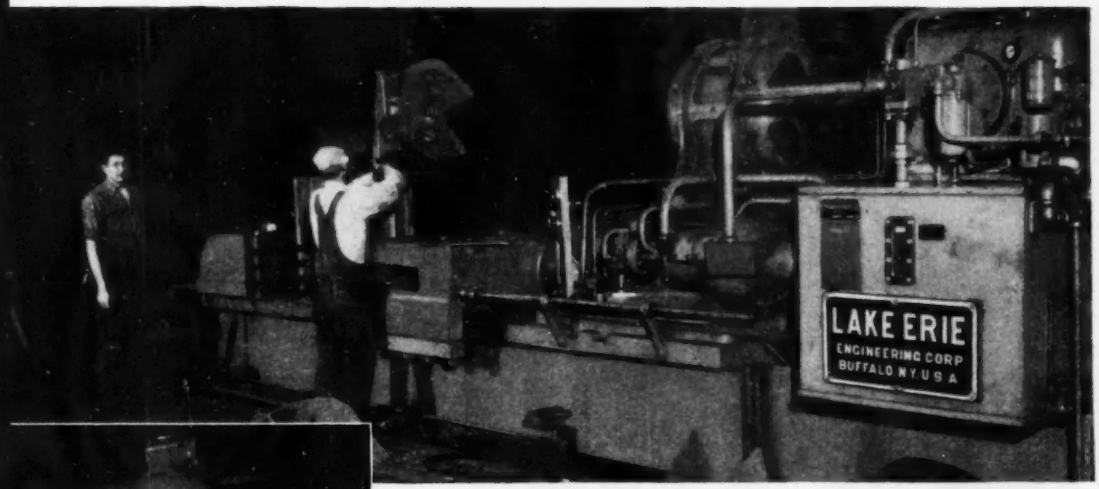


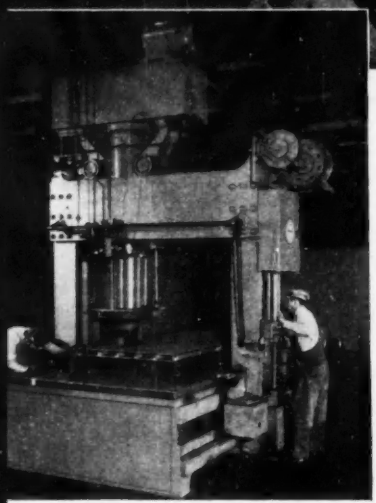
2000 TON DOUBLE ACTION PRESS.

This press has a 500 ton hydro-pneumatic die cushion, bed size of 96"x96" and daylight opening of 60". It is used generally for forming large pieces requiring high tonnage, but is also used for heavy blanking jobs.

500 TON SINGLE ACTION PRESS *left* —750 TON DOUBLE ACTION *right*.

These presses are used for a wide variety of forming operations including blanking, bending, drawing, piercing and coining. The pieces illustrated at left above are a few examples of the work done on the three presses shown on this page.





500 TON HYDRAULIC BULLDOZER.
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● The piece shown above is another example of hydraulic bulldozer work. It illustrates draft frame bottom plates which are hot formed from ⅜" thick stock 7½' long before bending. Draft frame reinforcement also formed on hydraulic bulldozer is shown at left.

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Only **THE DUMORE**®

Automatic Drill Head offers the technique of "Resistance Drilling"... eliminates drill breakage

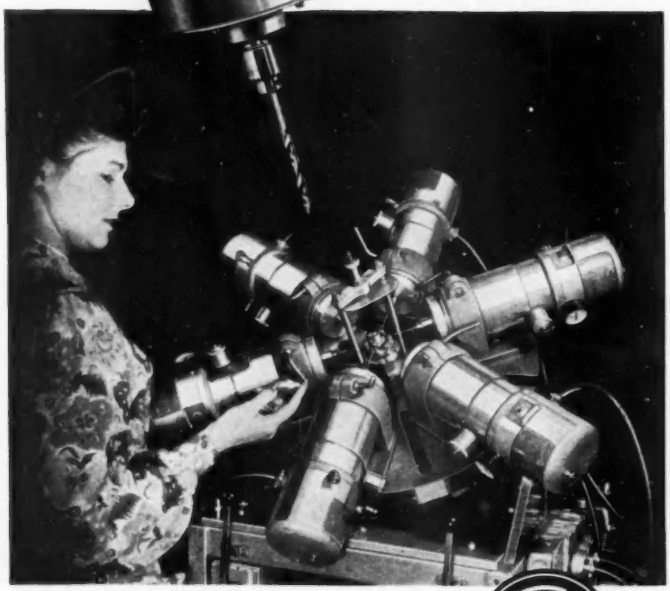


UTILIZING an entirely new drilling technique . . . "resistance drilling" . . . the Dumore Automatic Drill Head is proving it can virtually eliminate drill breakage when used for small-diameter, deep-hole drilling operations.

With "resistance drilling," the workpiece determines the rate of drill feed and speed. The tool always maintains uniform pressure. No need to rely on operator guesswork. Permits working closer to the maximum strength of the drill.

Based on proven field results under average conditions, this tool has set remarkable production records when operating with these drill diameters: up to $\frac{3}{32}$" in steel; up to $\frac{1}{8}$" in brass, aluminum, zinc and cast iron; up to $\frac{9}{32}$" in plastics and wood.

Get all of the advantages of this amazing shop tool. Specify the Dumore Automatic Drill Head. Ask your nearby industrial distributor for a demonstration, or write to The Dumore Company.



This unusual setup is typical of the many ways that the Dumore Automatic Drill Head can save costs on a production problem. Here, labor costs on bronze nozzle holders were slashed $75 on the first run of 5273 pieces.

THE DUMORE COMPANY

1339 Seventeenth Street • Racine, Wisconsin

(*Continued from page* 148)

Chase Aircraft Co., Inc., West Trenton, N. J.
Military aircraft & components—$1,867,850 (40)

Chrysler Corp., Trenton, Mich.
Plaques for military type batteries—$579,830 (60)

Cleveland Steel Products Corp., Cleveland, Ohio
Ordnance—$1,043,530 (40)

Congoleum-Nairn, Inc., Kearny, N. J.
Aircraft parts—$10,735 (65)

Continental Foundry & Machine Co., Wheeling, W. Va.
Castings for ordnance — $456,750 (65)

Cook Electric Co., Chicago, Ill.
Aircraft parts—$18,600 (65)

Crown Controls Co., Inc., New Bremen, Ohio
Aircraft components—$29,500 (50)

Curtiss-Wright Corp., Wood-Ridge, N. J.
Aircraft engines & parts—$115,-921 (60)
Aircraft engines and parts—$418,-820 (50)

— D —

John Deere Spreader Works, Deere & Co., E. Moline, Ill.
Ordnance—$59,375 (65)

Dexter Mills, Inc., Chicago, Ill.
Aircraft parts—$157,064 (70)

Doehler-Jarvis Corp., Toledo, Ohio
Aluminum die castings for ordnance items—$880,000 (75)

Douglas Aircraft Co., El Segundo, Calif.
Aircraft and parts—$2,074,000 (40)

Douglas Aircraft Co., Inc., Santa Monica, Calif.
Aircraft & spare parts—$205,197 (65)

— E —

Electrical Engineering & Manufacturing Corp., Los Angeles, Calif.
Aircraft components—$16,744 (70)

Elnar Products, Inc., Fisherville, Mass.
Ordnance—$44,197 (70)

— F —

Fairchild Engine & Airplane Corp., Hagerstown, Md.
Aircraft parts—$68,171 (65)

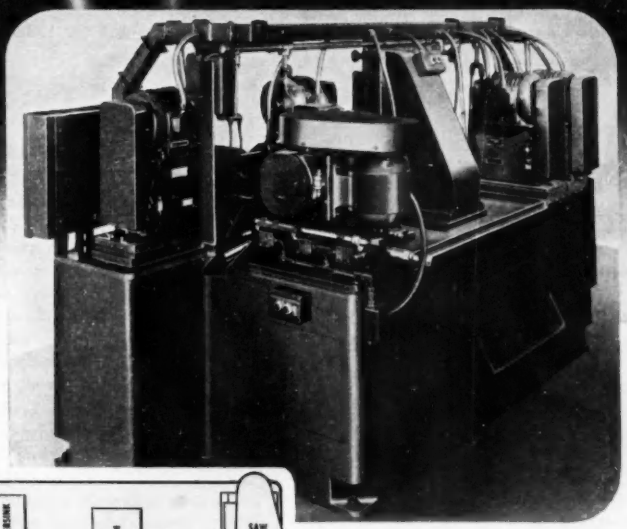
Fairchild Engine & Airplane Corp., Farmingdale & Valley Stream, L. I., N. Y.
Aircraft engines—$105,315 (65)

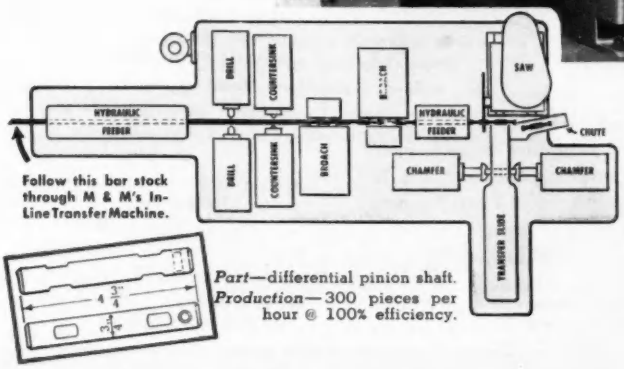
Ferro-Spec Laboratories, Inc., Los Angeles, Calif.
Inspecting & testing of aircraft parts—$2,950 (70)

The Fyr-fyter Co., Norwalk, Conn.
Ordnance—$68,625 (70)
(*Turn to page* 152, *please*)

MPISE

Typical M & M progressive IN-LINE automatic transfer machine.





Follow this bar stock through M & M's In-Line Transfer Machine.

Part—differential pinion shaft.
Production—300 pieces per hour @ 100% efficiency.

Motch & Merryweather's forward-looking design *unitizes* a number of operations in the same machine. You obtain maximum usable production per square foot of floor space. Furthermore, you effect the greatest possible savings in time, overhead and operating costs.

Manufactured by —THE MOTCH & MERRYWEATHER MACHINERY CO.—
CLEVELAND 13, OHIO
Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY • MACHINES AND EQUIPMENT

(*Continued from page* 150)

— G —

G. T. K. Corp., E. Hartford, Conn.
Experimental aircraft engine—$7,869 (70)

General Development Corp., Sussex, Georgetown, Del.
Airship components—$150,000 (45)

General Metals Corp., Burbank, Calif.
Aircraft parts—$37,495 (65)

Gibson Refrigerator Co., Greenville, Mich.
Ordnance—$432,748 (80)

Goodyear Aircraft Corp., Marioopa, Litchfield Park, Ariz.
Aircraft parts—$55,687 (65)

The Goodyear Tire & Rubber Co., St. Marys, Ohio
Ordnance—$511,030 (40)

Grimes Mfg. Co., Urbana, Ohio
Aircraft equipment—$93,745 (45)

— H —

The Hawker Mfg. Co., Dayton, Ohio
Ordnance—$72,650 (50)

Hughes Tool Co., Culver City, Calif.
Aircraft parts—$95,996 (55)
Aircraft parts—$1,394,103 (60)
Aircraft components—$83,600 (40)
Aircraft components—$95,631 (50)
Aircraft parts—$93,531 (50)
Aircraft equipment — $2,307,716 (55)
Aircraft parts—$823,712 (55)

Hydraulic Fittings Corp., Port Huron, Mich.
Aircraft fittings—$166,000 (70)

— I —

Indiana Gear Works, Inc., Indiana, Ind.
Gears and gear drives—$67,635 (70)

Interstate Engineering Corp., Anaheim, Calif.
Aircraft parts—$125,000 (45)

— J —

Jamestown Electro Plating Works, Inc., Jamestown, N. Y.
Plating of aircraft parts—$106,230 (55)

— L —

Landis Mfg. Co., Ferndale, Mich.
Ordnance—$8,985 (70)

The Lee Co., Westbrook, Conn.
Aircraft parts—$27,165 (55)

The Leland Electric Co., Dayton, Ohio
Aircraft parts—$65,225 (50)

Lockheed Aircraft Corp., Burbank, Calif.
Aircraft parts—$53,514 (50)
Aircraft and spare parts—$157,970 (60)

Lockheed Aircraft Corp., Van Nuys, Calif.
Military aircraft—$250,000 (65)

Lockheed Aircraft Service, Inc., Burbank, Calif.
Aircraft parts—$57,209 (65)

Lord Manufacturing Co., Erie, Pa.
Aircraft parts—$169,204 (65)

— M —

McLean Development Laboratories, Inc., Dallas, Tex.
Aircraft parts—$25,149 (70)

Magic Chef, Inc., St. Louis, Mo.
Aircraft parts—$14,362 (70)

Magic Chef, Inc., Cleveland, Ohio
Aircraft parts—$15,500 (70)

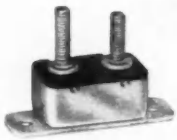
The Maytag Co., Newton, Iowa
Ordnance—$13,500 (65)

Meco, Inc., Paris, Ill.
Aircraft parts—$26,908 (45)

Meisel Press Mfg. Co., Boston, Mass.
Aircraft parts—$20,000 (70)

Metalco, Inc., Sheboygan, Mich.
Fittings for aircraft—$8,563 (60)
Fittings for aircraft—$11,263 (50)
(*Turn to page* 156, *please*)

Sure, you use these...



Fasco Automatic Reset Circuit Breaker



Fasco Hydraulic Stoplight Switch

These Fasco products have proved Fasco dependability, versatility, and economy throughout the automotive industry*.

but how about this?



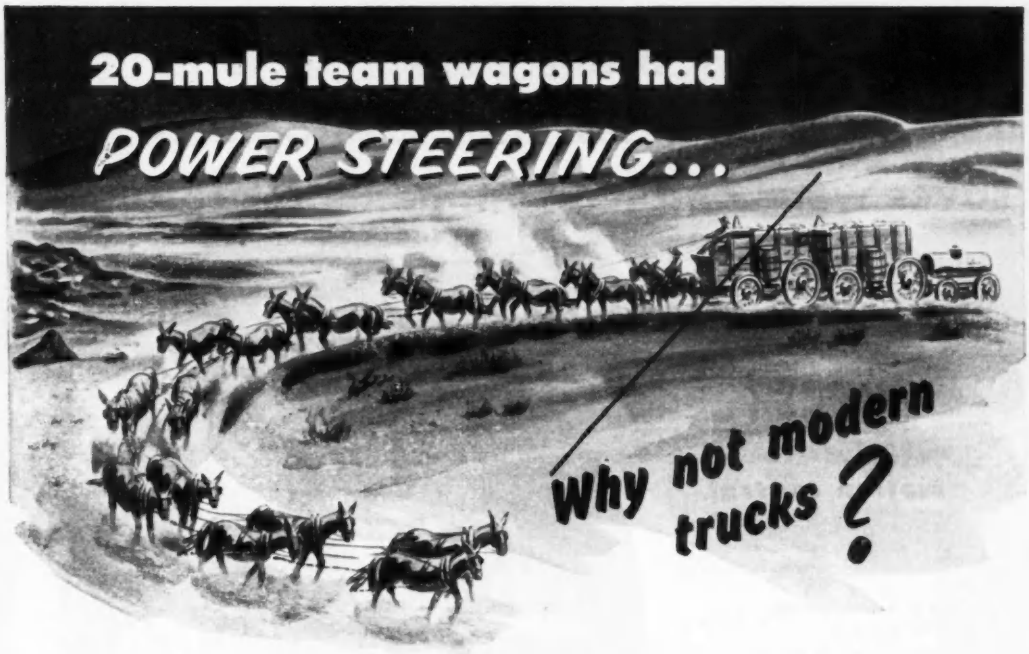
Fasco Directional Signal Flasher

The comparatively new Fasco Flasher has superior design features that are winning fast acceptance. If you haven't tested Fasco Flashes, look into the advantages they offer.

*FASCO furnishes original equipment for Ford • Mercury Hudson • Lincoln • Dodge • Chrysler • Kaiser • De Soto • Studebaker • Frazer • Plymouth • Checker Cab Nash • Reo • Packard • Diamond T • Buick • International Harvester • Cadillac • Crosley • Willys General Motors Trucks & Coaches, etc.

Formerly F. A. SMITH MFG. CO., INC.
FASCO Industries, Inc.
ROCHESTER 2, N. Y.

20-mule team wagons had POWER STEERING...



As the primitive 20-mule team wagons loaded with borax creaked their way 167 miles out of the bitter wastes and murderous heat of Death Valley, the drivers had the benefit of power steering. The mules furnished the power for steering as well as propulsion of the two 4-ton wagons. The driver only guided the mules.

Today's truck transport is generally superior in every way but one. Too often the far heavier manual steering load is on the arm, shoulder and back muscles of the driver. This tiring work slows him down, reduces his efficiency, makes him "accident-prone."

Vickers Hydraulic Power Steering makes the heaviest vehicle almost effortless to steer . . . even under the brutal conditions of nearly roadless deserts like Death Valley. A light finger touch is enough. Ruts, soft shoulders, obstructions, flat tires, off road conditions cannot cause wheel spin or loss of control. Steering no longer fatigues the driver—he remains fresh, efficient, safe.

For further information on Vickers Hydraulic Power Steering, ask for Bulletin M-5100.

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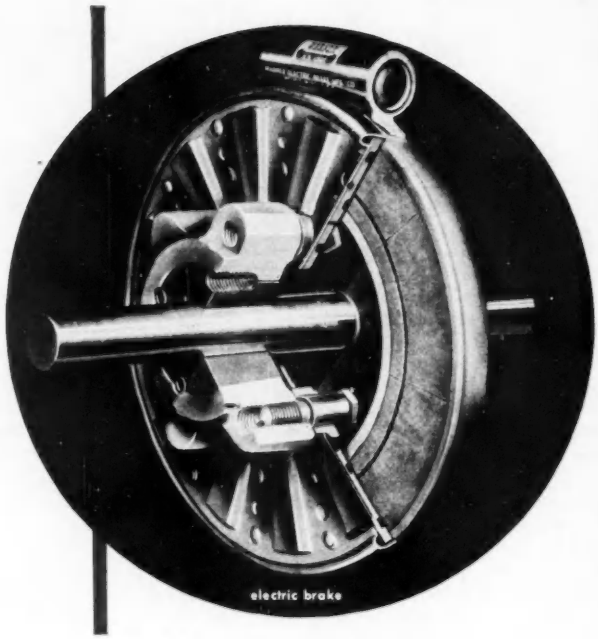


VICKERS hydraulic
POWER STEERING
Is Effortless, Positive and Shockless

Warner Electric Brake stops LeBlond lathe in less than a second... saves wear and tear on the motor

WARNER
electric motion control

- **stops spindle smoothly in less than a second**
- **saves wear and tear on motor**
- **speeds operation—saves time and motion**
- **wears longer—requires less servicing**
- **cuts manufacturing costs—few parts to assemble**



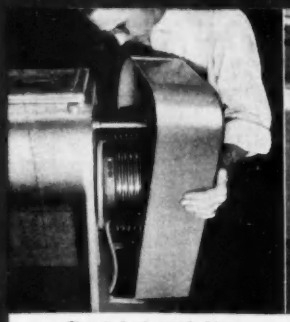
How fast can a brake get? Less than a second is what it takes to stop the high speed LeBlond lathe. That's a second of smooth, gradual deceleration—there's no grab or shock—because Warner Electric Brakes give you precisely controlled application of speed and power.

By speeding operation of this machine, Warner Electric Brakes save operator time and increase his productivity on long or short run turning. Convenient two-station electric spindle control provides simple, efficient operation, minimizing fatigue, particularly on long-bed machines. Former tendency to stop spindle by reversing the motor has been eliminated. The motor lasts longer. Brake lasts longer too, because it dissipates heat so rapidly. Added to these improvements are definite sales and manufacturing advantages. Brake is easily and economically assembled on the drive shaft. Since it lasts longer and has fewer parts . . . little, or no factory servicing is required.

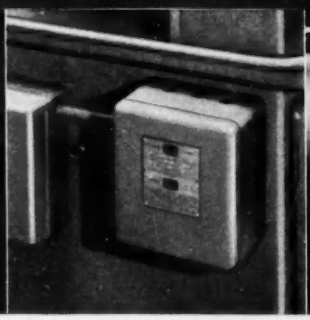
Numerous stop-start problems are efficiently solved by Warner *electric motion control.* Improvements have been made, too, on applications controlling speed, tensioning, positioning, coupling, indexing and rapid cycling. Your Warner representative will gladly demonstrate . . . see coupon below.

ELECTRIC BRAKES & CLUTCHES

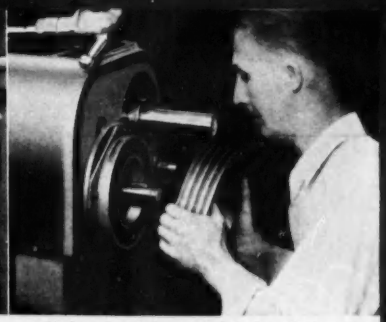
FOR INDUSTRIAL APPLICATIONS



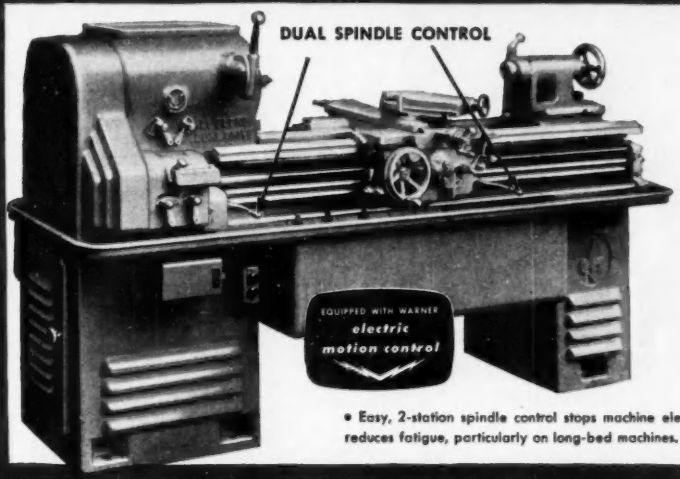
• Electric brake and drive pulley are mounted compactly to main drive shaft.



• Warner control provides efficient braking circuit and rheostat for precise adjustment of torque and speed.



• Brake magnet is mounted to headstock casting. Mating armature is mounted on drive pins to inside of pulley. Simplicity cuts assembly costs.

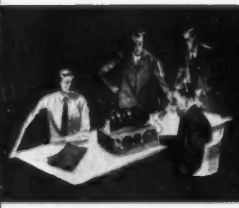


• Warner Electric Brakes are standard equipment on Regal Lathes, Dual Drive Lathes, Hollow Spindle Lathes and Turbine Lathes manufactured by the R. K. LeBlond Machine Tool Company, Cincinnati, Ohio. These machines are precision tools, for high production metalworking operations. Rapid, easily controlled stops and starts eliminate unproductive machine time . . . there is no coasting or waiting . . . loading and unloading is fast. Apron spindle control is simplified by electric brake principle.

• Easy, 2-station spindle control stops machine electrically . . . saves operator's time and reduces fatigue, particularly on long-bed machines.

Warner Electric Brakes, Clutches and Clutch-Brakes give you new, unique simplicity of design and operation. There are only two main parts, an armature and magnet. Operation is by *electro-magnetic*, instantaneous engagement and release of friction surfaces. Torque ratings are extremely high for small size and light weight. No coasting or slipping when "locked in." Easily designed into original equipment. Readily adapted to automatic cycles and remote control by limit switches, relays, electric-eyes, pushbuttons, etc. Rate of application accurately controlled to synchronize motions—give exact degree of speed and power required for your machine operation.

CONTROL ENGINEERING SERVICE . . . Warner offers complete application and control engineering service and field assistance. If you have a clutching, braking, tensioning, indexing or speed control problem, consult competent, experienced Warner brake and clutch specialists for reliable recommendations on torque, heat, electrical controls, capacity, etc.



Warner Electric Brake & Clutch Co., Dept. AI, Beloit, Wis. OUR 25th YEAR

☐ Please send your FREE Bulletin No. 703-A.

☐ Have your representative call to discuss my problem.

Firm Name_____

Individual_____ Title_____

Address_____

City_____ State_____

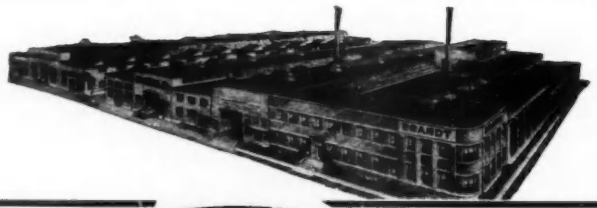
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A quarter of a million square feet of mass production metalworking facilities . . . It doesn't take much figuring to learn why Brandt has helped so many government and industrial manufacturers with their metalworking problems. Brandt—near steel mills, in the midst of major rail, water and highway transportation—offers assembly line scheduling, precision workmanship to exacting specifications and on-the-dot deliveries . . . Put Brandt's "Big Three" metalworking figures to work for **you** . . .

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Call on
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BRANDT
BALTIMORE

send for this helpful facilities folder . . .



CHARLES T. BRANDT, INC. Baltimore 30, Md.

(*Continued from page* 152)

— N —

Nash-Kelvinator Corp., Hamtramck, Mich.
Aircraft parts—$321,800 (40)

Nesco, Inc., Granite City, Ill.
Ordnance—$42,140 (65)

New Process Gear Corp., Syracuse, N. Y.
Aircraft parts—$109,442 (70)

— O —

Olin Tool Machine Co., Alameda, San Leandro, Calif.
Ordnance—$45,330 (45)

The Oliver Corp., Cleveland, Ohio
Earth moving equipment for the Armed Services—$190,090 (50)

Oro Manufacturing Co., Adrian, Mich.
Aircraft parts—$55,000 (70)

— P —

Parsons Tool, Inc., Berlin, Conn.
Aircraft parts—$16,665 (70)

Pass and Seymour, Inc., Solvay, N. Y.
Ordnance—$229,741 (25)

Plane Parts, Inc., New Haven, Conn.
Aircraft parts—$18,645 (70)

— R —

Radax Mfg. Co., Rochelle Park, N. J.
Ordnance and aircraft parts—$27,-155 (70)

Ruffe, Inc., Dude, Fla.
Aircraft accessories—$144,000 (45)

— S —

Saco-Lowell Shops, Saco, Maine
Ordnance—$2,800,000 (40)

Scaife Co., Allegheny County, Pa.
Ordnance—$301,219 (65)
Ordnance—$600,000 (25)

Simmonds Aerocessories, Inc., Tarrytown, N. Y.
Aircraft parts—$477,441 (60)

Standard Air Lines, Inc., Long Beach, Calif.
Aircraft parts—$13,702 (70)

— T —

The Torrington Mfg. Co., Torrington, Conn.
Ordnance—$90,000 (40)

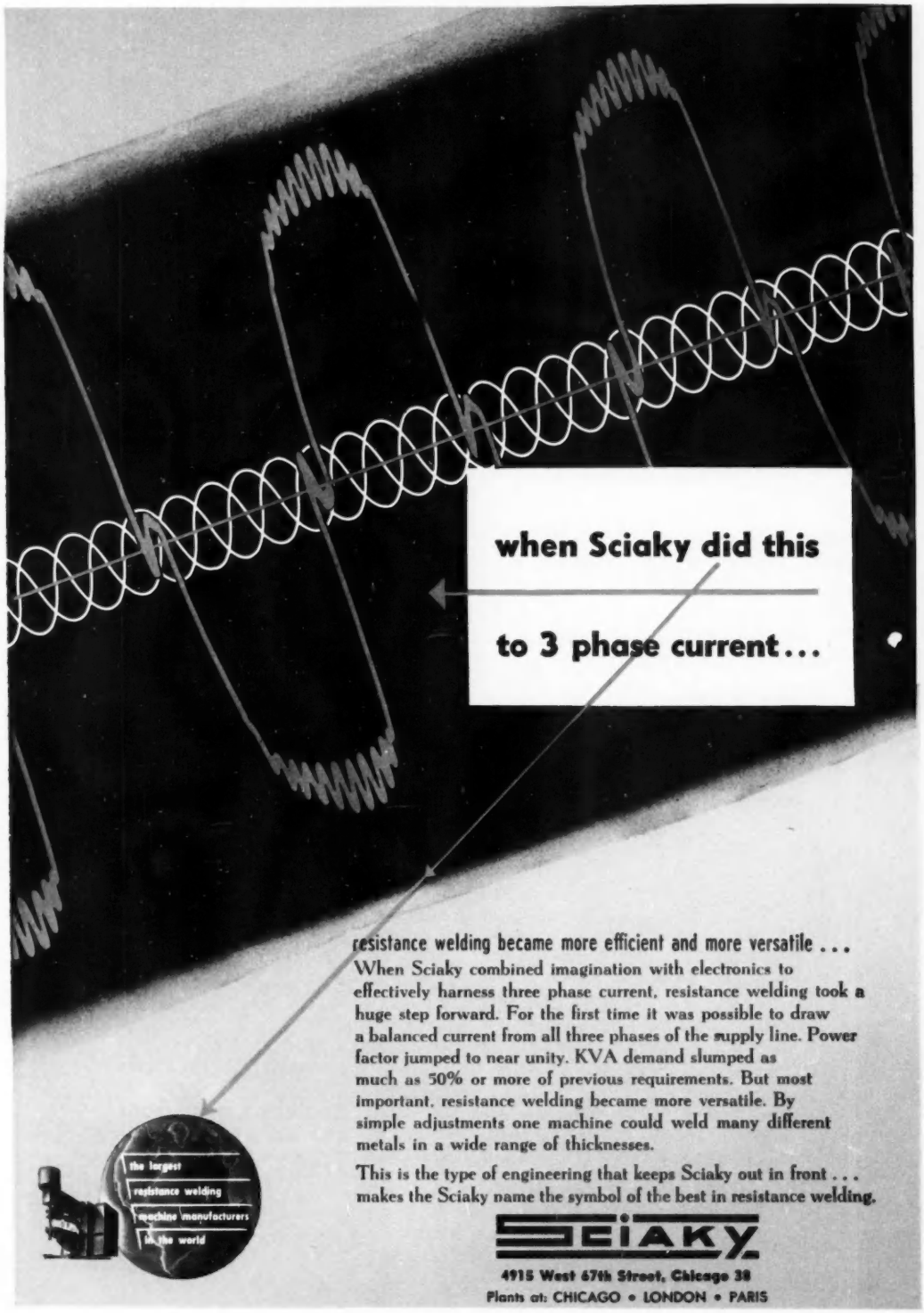
Triplex Industries, Inc., Riverdale Station, Ill.
Ordnance—$28,500 (45)

— U —

United Aircraft Corp., Bridgeport, Conn.
Helicopters—$845,800 (60)

United Aircraft Corp., E. Hartford, Conn.
Aircraft engines and parts—$375,-000 (45)

(*Turn to page* 159, *please*)



resistance welding became more efficient and more versatile . . .

When Sciaky combined imagination with electronics to effectively harness three phase current, resistance welding took a huge step forward. For the first time it was possible to draw a balanced current from all three phases of the supply line. Power factor jumped to near unity. KVA demand slumped as much as 50% or more of previous requirements. But most important, resistance welding became more versatile. By simple adjustments one machine could weld many different metals in a wide range of thicknesses.

This is the type of engineering that keeps Sciaky out in front . . . makes the Sciaky name the symbol of the best in resistance welding.

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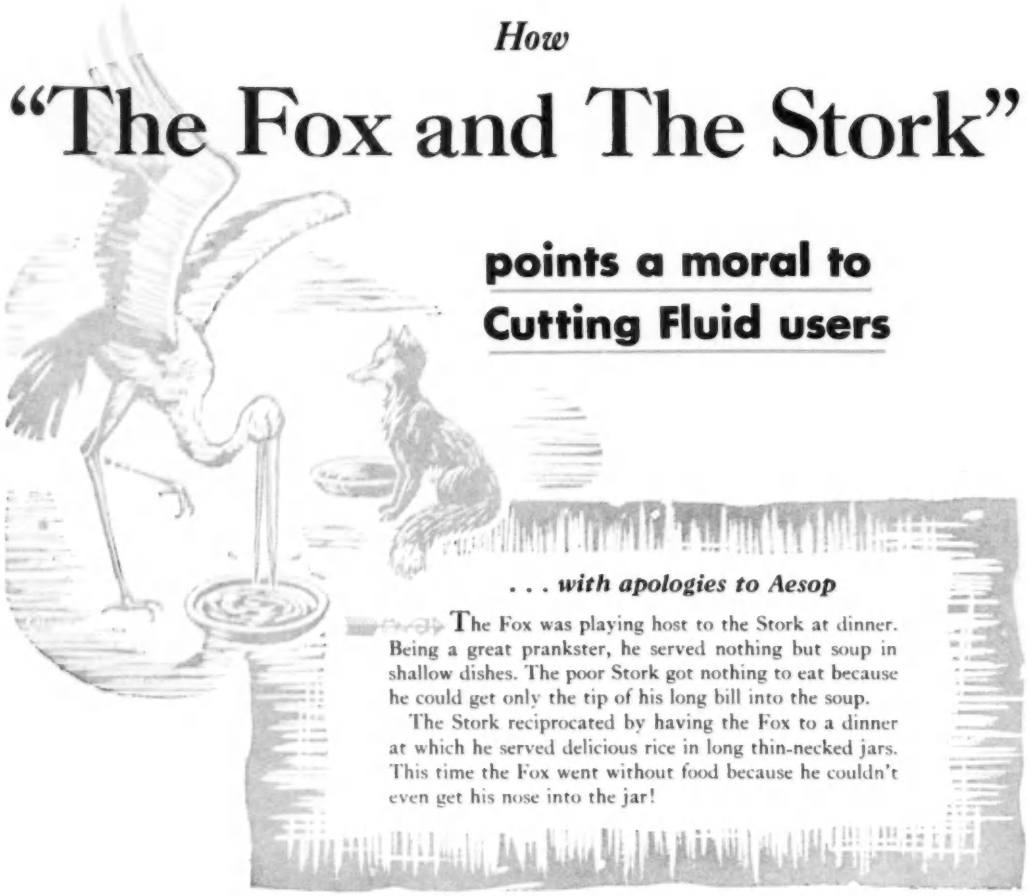
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How

"The Fox and The Stork"

points a moral to Cutting Fluid users



. . . with apologies to Aesop

The Fox was playing host to the Stork at dinner. Being a great prankster, he served nothing but soup in shallow dishes. The poor Stork got nothing to eat because he could get only the tip of his long bill into the soup.

The Stork reciprocated by having the Fox to a dinner at which he served delicious rice in long thin-necked jars. This time the Fox went without food because he couldn't even get his nose into the jar!

THE MORAL:

Like the Fox and the Stork in Aesop's fable, each cutting fluid has its own capabilities. When put on an application for which it is not suited the cutting fluid fails to give you the production, tool life or finish possible.

Stuart offers you a vast background of experience in the *selection and application* of cutting fluids, both water-mixed and straight oil types and has the cutting fluids to best meet your requirements. Ask to have a Stuart Representative demonstrate how proper selection and application of cutting fluids saves time, money and materials. Be sure to ask him for the booklet "More Than a Coolant Is Needed."

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Circular slide rule makes dilution of cutting fluids quick, easy! For tanks of 1 to 100 gallons. Fill in coupon, clip to your company letterhead and mail to:

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Name .....

Title .....



(*Continued from page* 156)

United States Testing Co., Inc., Hoboken, N. J.
Aluminum forgings for aircraft—$8,510 (65)

—V—

Vahl Engineering Co., Brooklyn, N. Y.
Aircraft components—$23,454 (70)

—W—

West Bend Aluminum Co., West Bend, Ind.
Ordnance—$491,064 (40)

Western Electric Co., Inc., Greensboro, N. C.
Aircraft parts—$66,825 (65)

Whirlajet, Inc., Long Beach, Calif.
Aircraft parts—$11,990 (70)

Willard Bronze Co., Cincinnati, Ohio
Aircraft parts—$162,301 (55)

Woodall, Inc., Los Angeles, Calif.
Aircraft subassemblies — $233,284 (45)

—Y—

York-Shipley, Inc., York, Pa.
Ordnance—$250,000 (45)

BOOKS . . .

THE ECONOMIC PROCESS: Its Principles and Problems; by Raymond T. Bye and William W. Hewett, published by Appleton-Century-Crofts, Inc., 35 W. 32nd St., New York, N. Y. Price, $5.50. Containing over 1000 pages of absorbing reading, this valuable work combines discussions of problems of policy with the exposition of theory. Woven into an integrated whole are three important aspects of economics. These are: a description of economic institutions; an analysis of economic principles; and a consideration of policy problems. The organization of the book's material has been painstakingly done from its general outline down to the details of each chapter, leading the reader by easy stages from the familiar to the unfamiliar, always explaining a new term or an idea fully when introducing it for the first time, and building gradually on the foundation of knowledge that has been laid before. Principles are analyzed step by step and then illustrated with concrete cases of their practical applications. For example, after the authors have developed the theoretical concepts of production and income and the relations between them, they tie this analysis in closely with the exposition of the measurement of national income in the succeeding chapter. By the same token, the principles of large-scale production and the optimum firm are applied to a discussion of the problems of monopoly and public utilities regulation, while in the chapters on monetary problems, the concepts of neutral money and the circuit flow are applied. This same keynote of showing the application of economic theory to every-day problems is followed throughout all nine parts of the volume; a general view of our economic system; some problems of business enterprise; money and the level of economic activity; the price system; sharing the product of industry; international economic relations; the worker in industry; public finance; and alternative systems of economic organization.

THE STERLING AREA: An American Analysis; published by Mutual Security Agency, available from Superintendent of Documents, c/o U. S. Government Printing Office, North Capitol and G Sts., N.W., Washington, D. C. Price, $3.00. Produced by the research staff of the ECA Mission to the United Kingdom, this 672-page volume, profusely illustrated with charts, tables, etc., describes the Sterling Area, the economies of its member countries, and the characteristics of their economic relations with the rest of the world. Emphasis is, of course, placed on the past, present, and future relations of these nations with the United States. Special attention is given to the development of the trade patterns of the Sterling Area and the economic factors which influenced them during the post-war period until 1950. The volume is divided into three major parts. Book One deals with the composition, origins, and growth of the Sterling Area; Book Two is made up of individual sections about each of the countries or regions in the group; and Book Three consists of chapters on each of the major commodities which enter into trade between dollar and sterling countries.



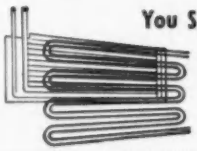
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STAINLESS STEEL

PLATECOILS

REPLACE PIPE COILS

to SAVE YOU 50% in TANK HEATING and cooling



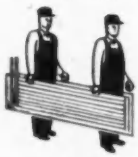
You SAVE 50% in tank SPACE

A 22" x 47" Platecoil gives the same heat transfer surface as 32 ft. of 1½" pipe. This pipe requires a space approximately 30" x 60". Platecoil thus saves about 50% over equivalent pipe coil in space inside your tank.



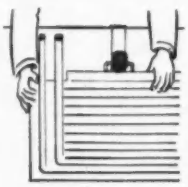
You SAVE up to 50% in initial COST

The initial cost of stainless steel Platecoil is often 50% or more below the cost of equivalent pipe coil. Less time is required to install Platecoil with corresponding saving in installation labor.



You have 50% LESS WEIGHT to handle

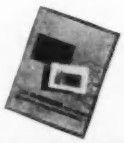
Weighing only about half as much as equivalent pipe coil, Platecoil is easy to handle. A whole maintenance crew is not needed to transport and install it.



You SAVE 50% in maintenance LABOR

The Platecoils can be replaced in a matter of minutes and without emptying the tank. There is no need for workmen to get inside the tank in order to make replacements.

Send for your free copy of the new brochure of Platecoil applications. Write for Bulletin No. P74.





More Defense Contract Awards

THIS latest list of defense prime contracts that have been awarded covers the period from September 21 to October 17. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

— A —

AC Spark Plug Div., General Motors Corp., Flint, Michigan
Spark plug—92,900 ea—$125,415

ACF Brill Motors Co., Phila., Pa.
Spare parts—$320,000

Adel Division, General Motors Corp., Burbank, Calif.
Maintenance parts—Various—$43,226

Aerial Machine & Tool Corp., Long Island City, N. Y.
Rinks & link assy. for all aircraft—Various—$41,064

Aeroquip Corp., Jackson, Michigan
Hose—Various—$84,441

Ainsworth Mfg. Corp., Detroit, Michigan
Vehicle parts—4000 ea—$48,264

Air Associates, Inc., Teterboro, N. J.
Cap assy.—Various—$27,867

Airborne Accessories Corp., Hillside, N. J.
Spare parts—$78,003

Algonac Manufacturing Co., Algonac, Mich.
Vehicle parts—1477 ea—$74,750

Aluminum Company of America, Washington, D. C.
Aluminum sheet—186,000 lb—$71,141

Anzick Auto Body Parts Co., Inc., Van Dyke, Mich.
Vehicle parts—1265 ea—$55,584

The Armstrong Rubber Co., West Haven, Conn.
Tires—306 ea—$28,308

W. G. Avery Body Co., Inc., Magee Works, Magee, Mississippi
Vehicle parts—5500 ea—$49,830

— B —

Belmont Radio Corp., Chicago, Illinois
Indicators—67 ea—$89,466
Rectifier—67 ea

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.
Adapter-pin assy.—Various—$47,031
Vehicle parts—500 ea—$25,228
Wheel, brake, strut and cylinder assy.—Various—$208,362
Carburetor assys.—Various—$67,278

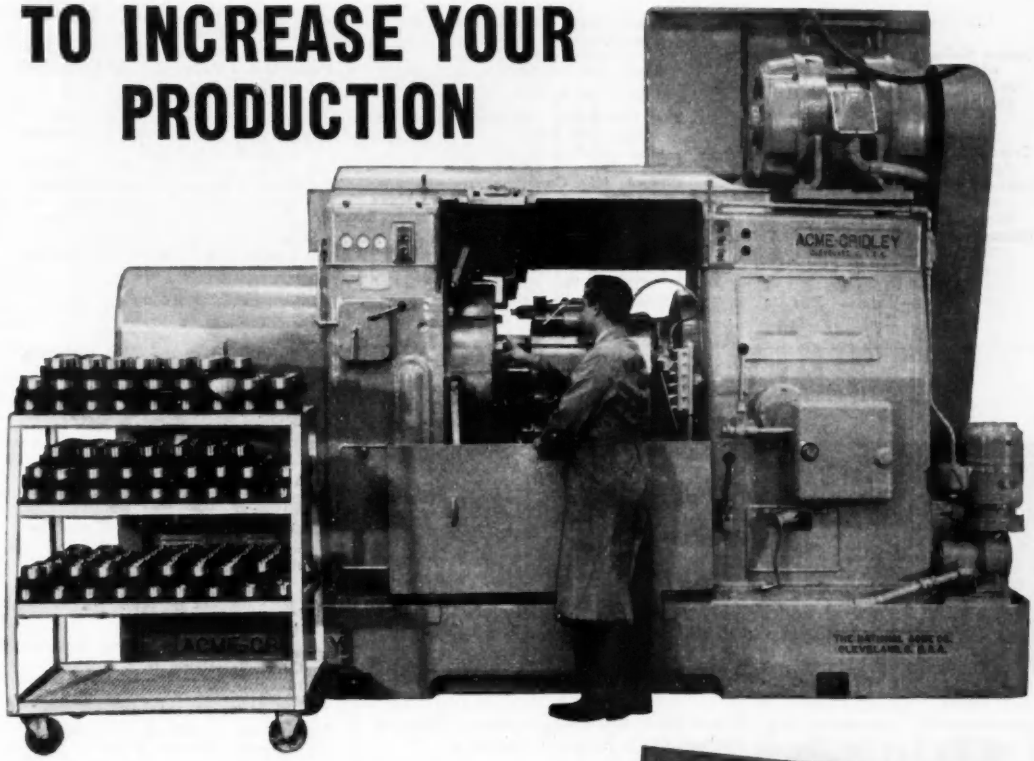
Bendix Westinghouse Automotive Air Brake Co., Elyria, Ohio
Vehicle parts—12,500 ea—$70,623

Bowen-McLaughlin-York, Inc., York, Pa.
Tanks, medium, M4A1—17 ea—$59,123
75 MM gun, VVSS

The Budd Company, Detroit, Michigan
Automotive parts—700—$29,932

(*Turn to page* 162, *please*)

TO INCREASE YOUR PRODUCTION



GET THE ADVANTAGES of the latest developments in multiple-spindle automatic chucker operation —get Acme-Gridley fully hydraulic chucking machines, the choice of a constantly growing list of important manufacturers who are stepping up their output of parts for shells, guns, tanks and planes.

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(*Continued from page* 160)

Burner-Hollomon Mfg. Corp., Hyattsville, Md.
Stand, engine overhaul—Various—$32,351

—C—

Carren & Company, Inkster, Michigan
Vehicle parts—1500 ea—$48,105
Carter Carburetor Corp., St. Louis, Missouri
Vehicle parts—26,000 ea—$50,073
Champion Spark Plug Co., Toledo, Ohio
Spark plugs—158,775 ea—$269,554
Spark plugs—69,125 ea—$87,720
Spark plugs—Various—$254,324
Chrysler Corp., Detroit, Michigan
Spare parts—31,000—$2,669,625
Spare parts—7960—$1,851,657
Spare parts—1,366,790—$362,337
Vehicle parts—6000 ea—$81,360
The Cleveland Pneumatic Tool Co., Cleveland, Ohio
Main gear piston—$113,200
Clifford Mfg. Company, Div. of Standard-Thomson Corp., Waltham, Mass.
Oil cooler—465 ea—$123,690
Cole Electric Products Div., Federal Electric Prods. Co., Long Island City, N. Y.
Power panel—124 ea—$25,763
Consolidated Vultee Aircraft Corp., San Diego, California
Maintenance parts—Various—$53,633
Consolidated Vultee Aircraft Corp., Fort Worth, Texas
MUT's—$400,000
B-36H aircraft—83 ea—$20,000,000
Continental Aviation & Engineering Corp., Detroit, Mich.
Auxiliary power unit—19 ea—$953,754
Continental Motors Corps., Muskegon, Michigan
Tank spare parts—39,775 pieces—$689,575
The Copper Tire & Rubber Co., Findlay, Ohio
Tires—15,000 ea—$142,984
Corbitt Company, Henderson, N. C.
Rebuild of truck prime mover, 7½ ton, 6 x 6—300 ea—$796,392
The Cuno Engineering Corp., Meriden, Conn.
Vehicle parts—2000 ea—$184,162

—D—

Dana Corp., Toledo, Ohio
Housing, transm, turbine—200 ea—$57,153
Detroit Aluminum & Brass Corp., Detroit, Michigan
Vehicle parts—1250 ea—$34,681

—E—

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.
Barometric altitude control—485 ea—$148,691
Inverters—944—$460,729
Starter assys.—640 ea—$149,862
Generators—180 ea—$198,461
Maintenance parts—Various—$37,040
The Electric Auto-Lite Co., Toledo, Ohio
Vehicle parts—24,000 ea—$33,194
Steel ignition cable—Various—$60,072
Electrical Eng. & Mfg. Corp., Los Angeles, Calif.
Actuator assys.—20 ea—$26,381
Electro-Switch & Controls, Inc., Culver City, Calif.
Relay—964 ea—$49,019

—F—

Federal Motor Truck Co., Detroit, Michigan
Spare parts—26,790—$81,266
Coleman tow tractor—834 ea—$16,494,012
Fletcher Aviation Corp., Pasadena, Calif.
Fuel tanks—6828 ea—$203,201

—G—

Gar Wood Industries, Inc., Wayne, Michigan
Vehicle parts—1440 ea—$25,834
Gaveco Laboratories, Inc., New York, N. Y.
Exciter regulators—2699 ea—$1,159,230
Gemco Engineering & Mfg. Co., Glendale, Ohio
Rebuild, trailer, 1 ton—5000 ea—$233,750
General Electric Co., Philadelphia, Pa.
Generators and control boxes—25 ea—$149,249
Services & materials—Various—$49,800

(*Turn to page* 164, *please*)

There is hardly anything in this world that some man cannot make a little worse and sell a little cheaper, and the people who consider price only are this man's lawful prey.
JOHN RUSKIN



Placed side by side, similar bushings of different make may look alike — *but are they?*

A·B·C Bushings are, and always have been made from only chromium, or chromium-tungsten oil hardening tool steels having wear resistance 18.5% greater than that of regular carbon water hardening tool steels.*

To capitalize fully on the inherent qualities of these finer steels, A·B·C Bushings are heat treated in one continuous automatic, electronically supervised operation with every step, including quenching, under a protective blanket of neutral atmosphere. This extra precaution insures high wear resistance right out to the initial working surface.

A·B·C Drill Bushings not only *last 18.5% longer,* but are *unexcelled for accuracy and concentricity.* That is why
A·B·C Bushings mean
More Holes Drilled per Dollar

A·S·A STANDARD

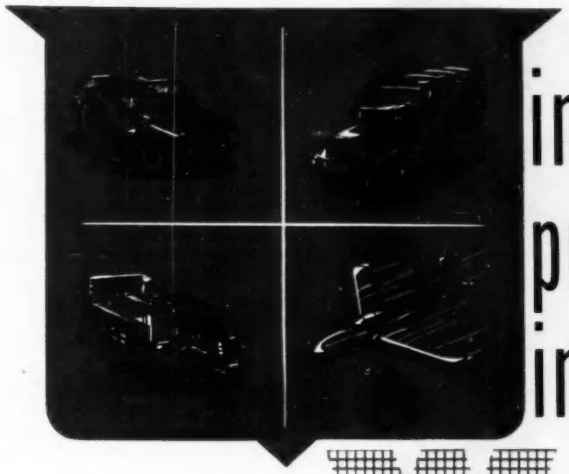
*See "A special American Machinist report to the metal working industries" © 1950 by McGraw Hill Publishing Company. Quoted by permission.

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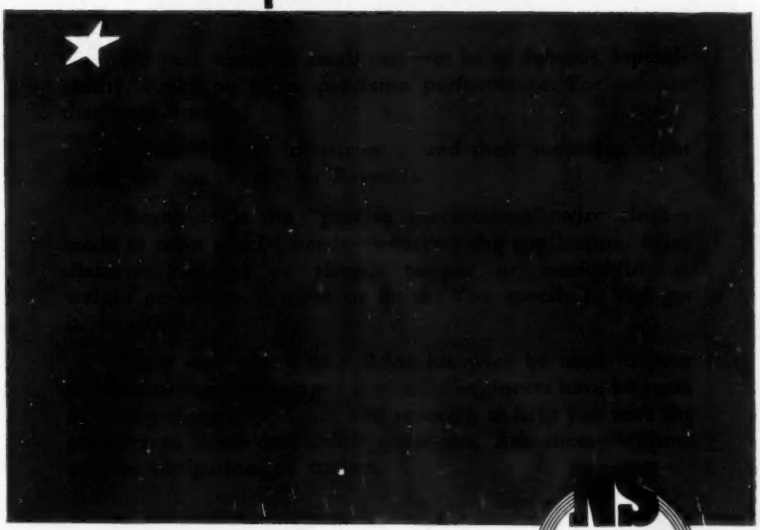
in prime defense industries

REYNOLDS WIRE protects performance



Small parts . . . but big in performance . . . air cleaners and brake linings are typical of many, many applications for which Reynolds wire is made to meet special needs of automotive and other "precise specification" industries.





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Divisions of National-Standard Co.

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NATIONAL-STANDARD...*Niles, Mich.*.....Tire Wire, Fabricated Braids and Tape
WAGNER LITHO MACHINERY...*Jersey City, N. J.*.....Metal Decorating Equipment
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NATIONAL-STANDARD Company NILES, MICHIGAN

Whether You're Tooling for:



or



Every Engineering Dept. and Model Shop Needs

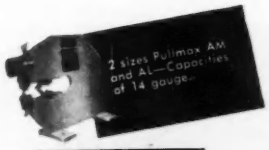
PULLMAX

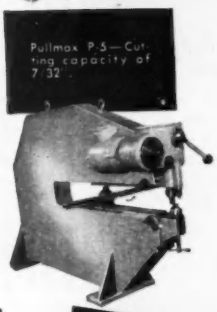
THE MOST COMPLETE LINE OF SHEET STEEL AND PLATE WORKING MACHINES

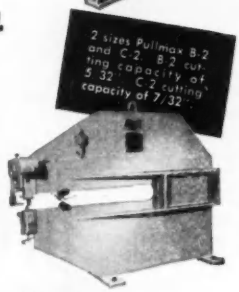
for Working Sheet or Plate Metal in Making Sample Parts and Small Production Runs Without the Expense of Costly Dies

Company after company is discovering the complete versatility of the amazing Pullmax machines. Made in many sizes to fit your requirements.

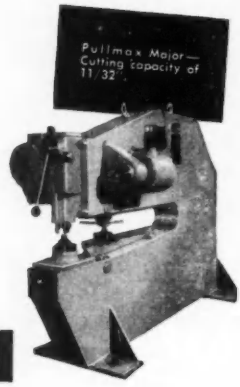
A reciprocating movable upper tool and stationary lower tool provides a smooth perpendicular cut that requires no further finishing. Upper tool can be raised to insert or remove work for cutting in center. Cutting capacities listed are for cutting mild steel.











PULLMAX DOES

- ★ STRAIGHT CUTTING
- ★ CIRCLE CUTTING
- ★ INSIDE CUTTING
- ★ IRREGULAR CUTTING
- ★ SLOT CUTTING
- ★ BEADING
- ★ FOLDING, OFFSETTING
- ★ NIBBLING



PULLMAX MACHINES WORK:

MILD STEEL	WIRE MESH
STAINLESS STEEL	PLASTIC
NON FERROUS METAL	and other materials



WRITE FOR LITERATURE AND PRICES TODAY

AMERICAN PULLMAX CO., INC.

2465 North Sheffield Avenue, Chicago 14, Illinois

(*Continued from page* 162)

Maintenance parts—Various—$50,672
Generators—Various—$108,904
Indicator—230 ea—$277,778
Knit-modification—220 ea—$75,680

General Electronic Devices, New York, N. Y.
Relay—Various—$33,808

General Motors Corp., GMC Truck & Coach Div., E. Pontiac, Mich.
Spare parts—2600—$103,110
Spare parts—4040—$66,521
Spare parts—98,146—$39,357
Spare parts—65,784—$52,738
Spare parts—35,100—$1,200,870
Spare parts—202,100—156,234
Vehicle parts—4,774 ea—$639,763

The B. F. Goodrich Co., Akron, Ohio
Boot de-icers & components—Various $136,025
Maintenance parts—Various—$31,039

The B. F. Goodrich Co., Dayton, Ohio
Wheel assy.—4000 ea—$2,528,676
Nose wheel assy.—1000 ea

Goodyear Aircraft Corp., Akron, Ohio
Envelope: airship—Various—$1,024,-684—$1,024,684

—H—

Hammond Mfg. Co., Pasadena, Calif.
Truck—2248 ea—$69,463

Hazeltine Electronics Corp., Little Neck, L. I., N. Y.
Indicator group—450 ea—$6,942,080

Houde Engineering Div., Houdaille-Hershey Corp., Buffalo, N. Y.
Vehicle parts—13,250 ea—$222,625

—I—

The Imco Mfg. Corp., New York, N. Y.
Relay—12,248 ea—$61,485

International Harvester Co., Detroit, Michigan
Spare parts—40,575—$131,909

—J—

Jack & Heintz, Inc., Cleveland, Ohio
Phase inverters—1,814 ea—$813,033

Johnson Bronze Co., New Castle, Pa.
Vehicle parts—70,000 ea—$34,475

—K—

Kollsman Instrument Corp., Elmhurst, N. Y.
Switch—390 ea—$44,070

—L—

Laher Spring & Tire Corp., Oakland, Calif.
Vehicle parts—940 ea—$25,051

Lanagan & Hoke, Inc., Warrington, Pa.
High voltage tester—77 ea—$26,587

LeJay Mfg. Company, Minneapolis, Minn.
Generators—650 ea—$73,283

Lockheed Aircraft Corp., Burbank, Calif.
Kits—22 ea—$27,126
Kits—122 ea
Kits—28 ea

Stuart F. Louchheim Co., Phila., Pa.
Voltmeter—333 ea—$63,265

—M—

M-D Parts Mfg. Co., Los Angeles, Calif.
Kit replenishment—20,000 ea—$71,600

Machine Tool & Die Co., Detroit, Michigan
Vehicle parts—2000 ea—$26,600

The Glenn L. Martin Co., Baltimore, Md.
Spare parts—Various—$42,856

(*Turn to page* 168, *please*)



Just turn the ignition key and you're ready to go—that's the new and convenient way of starting. And best of all, switch key starting, like most starting systems, costs less with Bendix* Starter Drive. This unique combination of convenience and low cost is made possible by Bendix exclusive design features. For example, the Bendix Starter Drive requires no actuating linkage and the solenoid may be placed in any convenient position. Result—starting motor can be mounted more easily and in more positions. Also, the Bendix Drive has fewer parts and needs fewer adjustments. If you want true economy from installation to service, plus performance proven by over 85,000,000 installations, be sure to specify Bendix Starter Drives. Your inquiry will receive immediate attention.

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PUSH BUTTON



FLOOR BUTTON

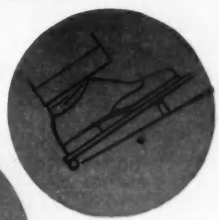
SPECIALISTS IN ALL TYPES OF STARTING!



SWITCH KEY



CLUTCH PEDAL



ACCELERATOR

"We insist on high quality springs—without flaws; and we're getting them from American Steel & Wire"

—SAYS THE YALE & TOWNE MFG. CO.



Yale Door closers are so reliable that nobody even *thinks* about them after they are installed. They're like brakes on a car: inconspicuous, yet they are expected to work every time without fail. Some of them, installed in public buildings, are flexed over 3½ *million* times in a ten year period.

A compact and powerful helical torsion spring is the heart of this famous door closer. It must deflect a full 150°, and store enough energy to return a heavy door against a strong wind.

As Yale & Towne puts it: "The burden of producing a high quality spring falls right on the shoulders of the spring manufacturer. Because of the great service life people have come to expect from our door closers, we insist on high quality springs—without flaws; and we're getting them from American Steel & Wire."

American Steel & Wire can produce and help you design a spring for just about any application, any size, any steel or finish. Let our skilled spring engineers show you how low in cost a truly superior spring can be. Call our nearest District Sales Office or write to American Steel & Wire Division, Rockefeller Building, Cleveland 13, Ohio.



FIRST, the springs are dipped in a special graphite and tallow mixture that was developed by Yale engineers. Then the springs are capped with plates and made into a spring group.



HERE is the final spring assembly in the Yale & Towne #75 door closer.



THIS IS the final check on the completed door closer. A steel bar is used to tighten the spring, then the bar is abruptly released. If spring action is correct, the unit is ready to be shipped.



MANY quality control checks are made at Yale & Towne, including this endurance test. Here, a door is opened and closed repeatedly, simulating the operating conditions in a heavy traffic area.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
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USS

U·S·S American Quality Springs

UNITED STATES STEEL

(*Continued from page* 164)

Montrose Div., Bendix Aviation Corp., S. Montrose, Pa.
Vehicle parts—14,000 ea—$46,284

Motor Truck Parts Co., Detroit, Mich.
Vehicle parts—4200 ea—$31,710

—N—

National Machine Products Co., Utica, Michigan
Vehicle parts—40,000 ea—$34,541

Nickel Cadmium Battery Corp., New York, N. Y.
Nickel-cadmium control batteries—40 ea—$62,238

Battery racks—40 ea
Spare components

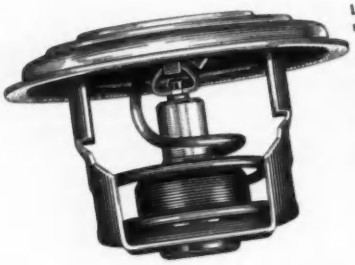
North American Aviation, Inc., Columbus Div., Columbus, Ohio
Maintenance parts—Various—$30,164

—P—

PM Industries, Inc., Stamford, Conn.
Switch—Various—$26,028

Pacific Division, Bendix Aviation Corp., N. Hollywood, Calif.
Accumulators & regulators—Various—$59,188
Bladder—used on accumulators — 1800 ea—$25,650

copper can be saved in radiators



Less copper is needed for smaller radiators of sealed cooling systems. To save it for National Defense and yet sustain the modern standard for cooling performance, specify DOLE THERMOSTATS. They have been designed to safeguard the cooling efficiency of the smaller radiator. DOLE THERMOSTATS allow the sealed cooling system to operate at peak efficiency; and the influence of pump pressures and cap pressures is fully offset. The engine operates under the constant protection of a most effective automatic temperature control.

Your ultimate buyer is assured of the quality and performance he expects under your name. Your nation's copper hungry defense industry benefits by the share you are able to relinquish.

with DOLE THERMOSTATS to regulate cooling

Control with DOLE

THE DOLE VALVE COMPANY • 1901-1941 Carroll Ave., Chicago 12, Illinois
Chicago • Detroit • Los Angeles

Pendley Body Co., Lubbock, Texas
Rebuild, trailer, 1 ton—5000 ea—$220,000

Philco Corp., Philadelphia, Pa.
Test harness—10 ea—$48,500

Piston Service Co., Detroit, Michigan
Vehicle parts—6150 ea—$26,934

Pump Div., Eaton Mfg. Co., Detroit, Michigan
Vehicle parts—2077 ea—$115,437

—R—

Reo Motors, Inc., Lansing, Michigan
Automotive parts—3900—$2,115,839
Automotive parts—4700—$66,952

Republic Aviation Corp., Farmingdale, L. I., N. Y.
XF-84H airplanes—2 ea—$500,000

Reynolds Metals Co., Louisville, Kentucky
Aluminum sheet—371,000 lb—$154,951

Robertshaw-Fulton Controls Co., Thermostat Div., Youngwood, Pa.
Indicators—5126 ea—$1,193,614

Rochester Products Div., General Motors Corp., Rochester, N. Y.
Maintenance parts—1003 ea—$54,124

Ryan Industries, Inc., Detroit, Michigan
Rate of climb indicators—6644 ea—$795,204

—S—

Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y.
Maintenance parts—Various—$54,101

Spencer Mfg. Co., Spencer, Ohio
Vehicle parts—1688 ea—$33,711

Sperry Gyroscope Co., Div. of Sperry Corp., Great Neck, L. I., N. Y.
Services & material—Various—$50,000

Strick Company, Phila., Pa.
Trailer—560 ea—$216,563
Spare parts—5½ sets—$19,045

Sunbeam Corp., Chicago, Illinois
Airspeed indicators—2779 ea—$491,525

—T—

Titeflex, Inc., Newark, N. J.
Maintenance parts—Various—$47,308

—U—

United Aircraft Corp., Chance Vought Aircraft Div., Dallas, Texas
Maintenance parts—Various—$77,379
Maintenance parts—Various—$63,056

United Aircraft Corp., Hamilton Standard Div., E. Hartford, Conn.
Propeller spares—Various—$164,823
Spare parts—Various—$590,157
Propeller spares—Various—$47,476
Bearings—3000 ea—$60,000
Maintenance parts—Various—$869,826
Synchronizer assy.—Various—$331,050
Spare parts—Various—$436,410
Spare parts—Various—$251,678
Synchronizer assy.—178 ea—$524,566
Head assy., flyball assy., pump assy. —Various—$1,439,848

United Aircraft Corp., Pratt & Whitney Aircraft Div., E. Hartford, Conn.
Spare parts—Various—$185,890
Maintenance parts—Various—8,991,363
Spare parts—Various—$2,424,013
Crankshaft assys.—213 ea—$608,178
Spare parts—Various—$3,348,150
Spare parts—Various—$106,435
Spare parts—Various—$116,677
Spare parts—Various—$5,692,567

(*Turn to page* 170, *please*)



Years Ahead!

**in Acceleration! Speed Range!
Flexibility! Economy!
Servicing Convenience!**

New 40-passenger Transit Bus equipped with new LeRoi 200-hp V-8 engine

Transit Buses Inc.

... for more power in less space, with less weight

LE ROI H540/V8

Condensed H540 Specifications

Number of cylinders	8
Bore and stroke, inches	4½ x 4¼
Displacement, cubic inches	540
Horsepower, rated at rpm	207/3000
Speed range, rpm	600-3200
Weight bare, lbs.	1250

Now... V-8 gasoline or LPG engine power for heavy-duty bus applications! A 200-hp power plant only 45" long—about 14" shorter than an equivalent six-cylinder engine! Low weight-to-horsepower ratio — only 6 lbs. per HP! Speed range up to 3000 RPM! And Transit Buses, Inc. is first in the field to bring you this LeRoi H540 superiority—in a new 40-passenger model, one of the most powerful buses on the road today.

By taking advantage of the H540's compactness, Transit Buses, Inc. has been able to eliminate right-angle drive — and develop a drive-line that is more trouble-free and less expensive.

See this great new bus at the American Transit Association Convention, September 22-25, Atlantic City, N. J., or contact Transit Buses, Inc., Detroit 27, Mich., for details.

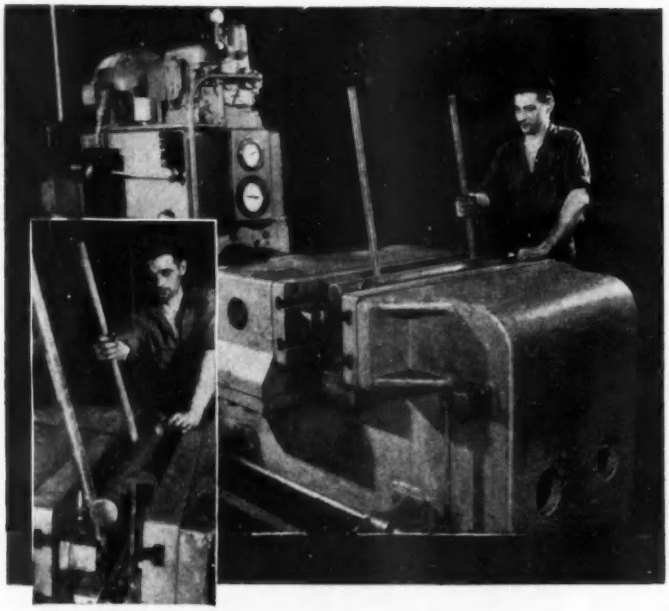
And get all the reasons why it pays to insist on buses powered by LeRoi H540's. Write us for H540 catalog.

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E-78



Mercury Mfg. Co. does a better job twice as fast with a

FARQUHAR Hydraulic Press

Mercury Manufacturing Co., Chicago, Ill., producers of fork trucks, tractors and trailers, uses a 200-Ton Farquhar Horizontal Bulldozer press to make forgings and stampings and to form plates. In operation 8 hours a day, the press does most jobs twice as fast as the mechanical bulldozer used formerly, and better speed control produces better work.

In addition, many pieces of work that used to be farmed out are now done at Mercury—providing better production and quality control, and effecting additional savings of time.

In the operation shown above, high carbon brazed steel is bent quickly and accurately. In other operations, the press forms heads on bolts, legs for caster forms, and bends structural T frames.

Mercury reports very small maintenance costs, and sums up the company's satisfaction with, "It's the best!"

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Just one more example of cost-cutting Farquhar performance in heavy production! Farquhar Presses are built for the job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of the extra guides on moving platen . . . easy, smooth operation with finger-tip controls . . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost!

Farquhar engineers are ready to help solve whatever production problem you may have. Give them a call.

Send for Free Catalog showing Farquhar Hydraulic Presses in all sizes and capacities for all types of industry. Write to: A. B. FARQUHAR Co., *Hydraulic Press Dept.*, 1523 Duke St., York, Pa.



—A. B. FARQUHAR COMPANY Division of THE OLIVER CORPORATION—

(*Continued from page* 168)

Spare parts—Various—$49,198
Spare parts—Various—$856,668
Shaft assy., liner, gear—Various—$3,391,748
Blade assys.—3934 ea—$733,691
Bearing—Various—$167,524
Stand—Various—$1,952,615
Parts—Various—$2,113,676
Jet engine tools—Various—$27,787
Gage—Various—$44,751
Spare parts—Various—$1,535,360
Spare parts—Various—$588,001
Cyl. assy., comp., rod assy. pump—Various—$157,232
Maintenance parts—Various—$46,820
Bearings—Various—$173,971
Cylinder assy. comp.—Various—$4,252,305
Parts—Various—$2,451,420

United Aircraft Corp., Sikorsky Aircraft Div., Bridgeport, Conn.
Spares—$75,000
Services and materials—Various—$84,441

United Specialties Co., Chicago, Illinois
Vehicle parts—29,000 ea—$103,820

United States Rubber Co., Phila., Pa.
Hose—Various—$34,462
Hose—Various—$98,801

—V—

Vickers, Inc., Detroit, Mich.
Valves & accumulators—Various—$76,963
Spares—10 ea—$178,768

—W—

The Wayco Aircraft Co., Troy, Ohio
Kit spares—352 ea—$489,086

Wagner Electric Corp., St. Louis, Missouri
Vehicle parts—40,000 ea—$51,680

Western Gear Works, Lynwood, Calif.
Box assy., actuators—Various—$29,768

Westinghouse Electric Corp., Philadelphia, Pa.
Regulator, relay assy.—395 ea—$159,669

Westinghouse Electric Corp., Aviation Gas Turbine Div., Phila., Pa.
Fuel control—Various—$133,218
Harness assy.—2219 ea—$65,662
Weight & valve assy.—Various—$54,233
Nut bracket—Various—$27,645
Spare parts—Various—$37,531

White-Rodgers Electric Co., St. Louis, Mo.
Servo—Various—$169,620

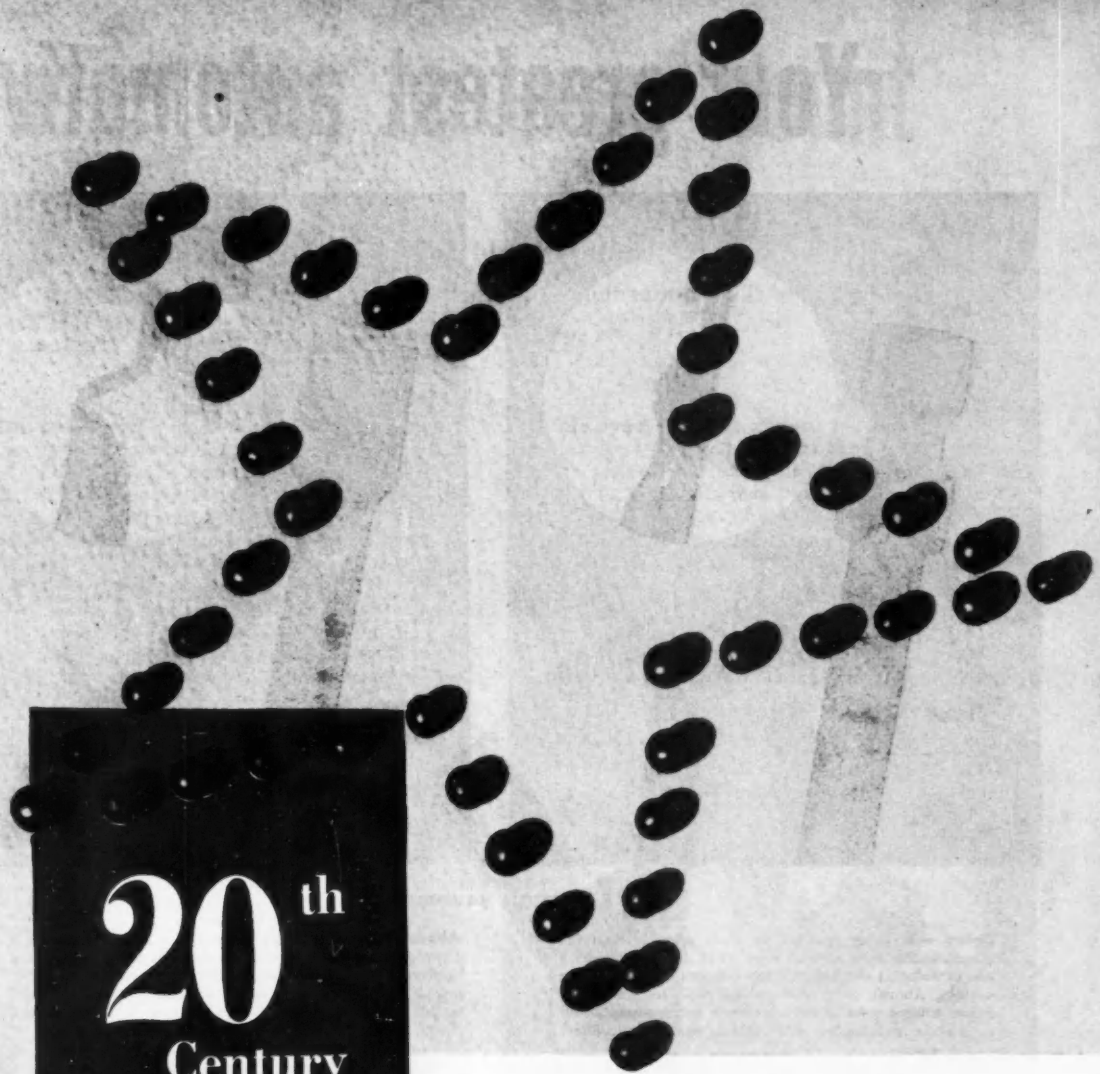
Wright Aeronautical Corp., Wood-Ridge, N. J.
Bearing—Various—$97,390

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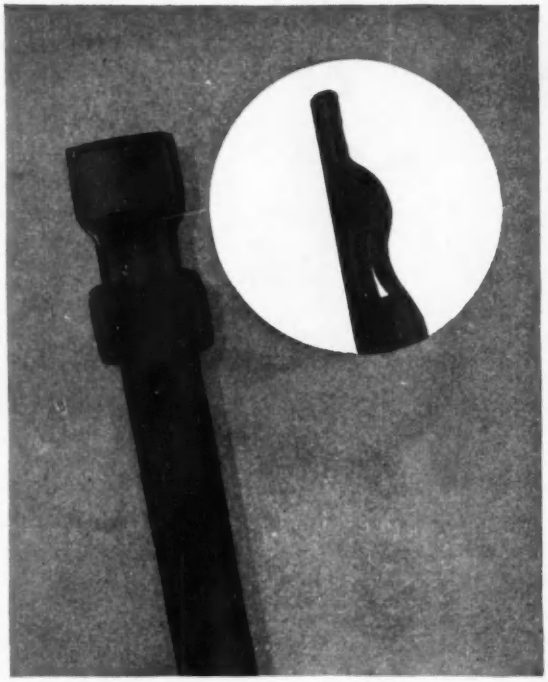
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One of the world's largest producers of *quality* shot, grit and powder —Normalized—Hard Iron—Cut Wire

Your greatest automotive





1. DESIGN SAVINGS

Doing everything possible to meet original customer specifications is a Bundy *must*. Yet Bundy engineers can often point out design improvements and fabrication savings. Above: vent tube, as specified, for use inside gasoline filler tube. Problem was to remove possibility of gasoline entering two side vents as gas tank was filled.

Above: Improved design suggested by Bundy engineers completely protects vent from gasoline entry by baffle deflection. More, this part requires just two operations: one to flatten end and pierce tube simultaneously, one to put double bend in flattened end. For customer, new design meant better function at lower part cost.

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DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

passed through a furnace. Copper coating fuses with steel. Presto . . .

Bundyweld, double-walled and brazed through 360° of wall contact.



← **NOTE** the exclusive patented Bundyweld beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: *Cambridge 42, Mass.:* Austin-Hastings Co., Inc., 226 Binney St. • ***Chattanooga 2, Tenn.:*** Pelrson-Deakins Co., 823-824 Chattanooga Bank Bldg. • ***Chicago 32, Ill.:*** Lapham-Hickey Co., 3333 W. 47th Place • ***Elizabeth, New Jersey:*** A. B. Murray Co., Inc., Post Office Box 476 • ***Philadelphia 3, Penn.:*** Rutan & Co., 1717 Sansom St. • ***San Francisco 10, Calif.:*** Pacific Metals Co., Ltd., 3100 19th St. • ***Seattle 4, Wash.:*** Eagle Metals Co., 4755 First Ave. South ***Toronto 5, Ontario, Canada:*** Alloy Metal Sales, Ltd., 181 Fleet St., East • **Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.**

tubing buy on every count



You buy unmatched tubing features, priceless safe performance, *plus* cost-paring engineering skills when you specify Bundyweld Tubing.

You get *more* for your tubing dollar when you specify Bundyweld for automotive fuel lines, oil lines, hydraulic brake lines.

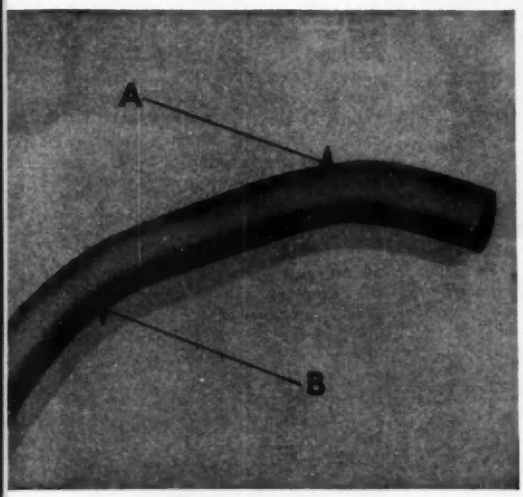
You buy unequalled tubing features. Bundyweld is the only tubing double-walled from a single strip, copper-brazed through 360° of wall contact. It's leakproof, highly resistant to vibration fatigue, lightweight, yet stronger.

You buy tubing performance that has made Bundyweld a byword for safety and dependability, proved by the 360,000 miles of Bundyweld used in cars, trucks and buses since 1930.

More, you buy the industry's finest skills and services. Bundy engineers help you work out the easiest, most economical way to produce new tubing parts; often save money by showing you how to use less tubing, how to make production short cuts. If you wish, Bundy will take over complete fabrication of your tubing parts — produce them as specified, deliver them on time.

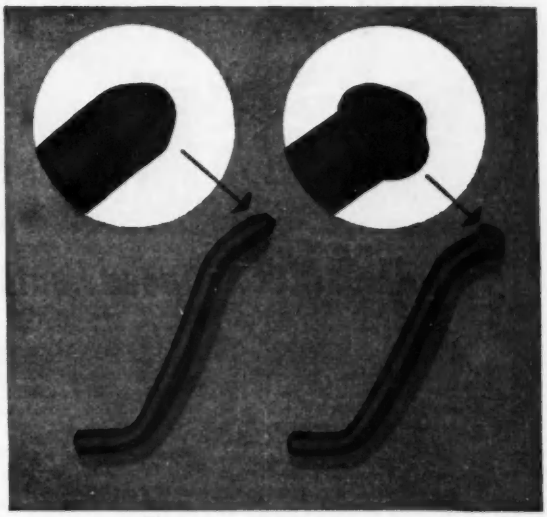
Whether you prize safe performance or cost-cutting engineering skills, specify Bundyweld . . . and you'll buy both.

Contact a Bundyweld Distributor (listed lower left), or write direct to *Bundy Tubing Company, Detroit 14, Michigan*



2. COST SAVINGS

Bundy engineers are always on the lookout for new ways to shave costs. For example, the 7/16"-O.D. oil tube shown above required two bends, yet both ends had to be held to exact size. The nearness of Bend A to the end of the part made holding of exact size difficult. Bundy engineers went right to work on the problem, came up with *results*: bending and sizing were combined in one press operation for high-volume production, lowered costs. Specify Bundyweld and you tap engineering skills dedicated to paring costs, whether you fabricate tubing parts or Bundy fabricates them for you.



3. FABRICATION SAVINGS

The 3/16"-O.D. timing-gear oiler tube shown above required tapered end for a nozzle effect. As specified by customer (left), it required numerous swaging operations. With customer's consent, Bundy added upset to nozzle tip (right). As a result, nozzle-forming operations were cut in half. But Bundy bird-dogging didn't stop there. Two hand-bending operations were incorporated into one automatic press operation. The over-all result: impressive fabrication savings to the customer, with no compromise in tubing function.

News of the MACHINERY INDUSTRIES

(*Continued from page* 55)

build cars for sale in England, the manufacturers reduced the work week to three or four days a week.

There is a tremendous desire among the people of England to buy new cars, and most every one waits five to six years for delivery of a car. It is rather difficult to understand the economy that forces a reduction in work hours, when the desire to purchase the cars is present there among their own countrymen.

Both in England, and on the Continent, the manufacturers are very confident of the future of machine tools. They realize that the American machine tool industry is pretty well absorbed with orders from the domestic market, and they are making a determined drive for all machine tool needs in other markets throughout the world.

Machine Tool Conference

Amplification was made on Mr. Crosby's remarks by Tell Berna, general manager of the NMTBA, at the Fifth Annual American Institute of Electrical Engineers Special Conference on Machine Tools held in Albany, N. Y., last month. Mr. Berna, quoting Harold Johnson, director of engineering of Vauxhall in England, stated that generally speaking most British machines are not designed to give efficient service in new modern progressive high production lines. The British machine tools are not sturdy or powerful enough to take full advantage of new metal cutting materials. Due to the design and light construction of British machine tools, they are expensive to maintain. The designers of British machine tools almost completely forget the maintenance problem and the operator of the machine.

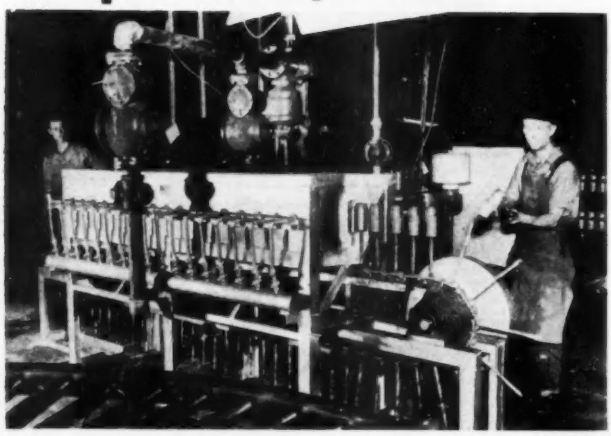
Mr. Berna still quoting Mr. Johnson stated that, "If the down time of a particular machine was excessive it was necessary to purchase additional machines for stand-by use. This resulted in excessive capital investment which, in turn, increased overhead rates. It also meant additional floor space, inefficient production lines and unsatisfactory material handling conditions due to having equipment in the lines which remained idle for a large part of the time."

"In addition to paying for the maintenance labor and material, in the case of a machine breakdown it is also necessary to pay an operator or a group of operators for producing nothing while the machine is down. With progressive production lines the stoppage of one section usually reduces or stops the production of a complete line."

"In order to make up for production lost during regular hours, it is necessary to work overtime and weekends and pay premium wage rates for the work you have already paid straight time for and did not get. In other words, the direct labor for a part can be two to three times the normal cost."

"In normal times when we have a buyer's market, lost production results in lost sales, which may result not only in the loss of a customer

Annealed Shell Blanks 1 every 6 seconds



with G. A. S. Hi Speed Heating

Compact—occupying floor space of only 2' x 10' — this G.A.S. Heating unit rapidly and uniformly heats the side walls of 60 MM shell blanks at the rate of 600 pcs. per hour. In the above application, the pieces, traveling through the 7' heating chamber in a single row, are completely enveloped in the protective atmosphere provided by the closely controlled combustion gases from the burners, minimizing scale formation.

This unit efficiently fits into the average production line set-up. Shell blanks are received direct from the press at far end — no steps or rehandling — and removed at front for cooling. Loading and unloading operations can be automatic.

Whether you have a shell annealing application, or some other heating problem where rapid, precise, and uniform heating would be of advantage to you, G.A.S. Hi Speed Heating methods warrant your further investigation.

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Maybe we're "sticking our neck out"—but we think your toughest milling problems can be handled *right* with Kent-Owens Machines!

On countless jobs—these Milling Machines have shown ability to turn out the work with top speed and high accuracy. They're outstandingly rugged . . . efficient . . . dependable. Designed with practical features that help you *produce more* . . . with *lower costs!* The Kent-Owens Standard line includes a wide range of hydraulic and hand operated machines. Let Kent-Owens engineers recommend machines and tooling best suited to your requirements. Write us about your needs. Kent-Owens Machine Company, Toledo, Ohio.

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. . . Simplify assembly by having available spare parts which need frequent replacement.

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Cleveland Containers illustrated above are especially suitable for the following purposes:

METAL END TELESCOPE OR CURLED AND DISC END for rod stock, small tools, instruments and various other items wholly or partially fabricated.

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for this year but for many years to come. We are fast approaching this situation in England."

Down Time Discussed

Particular British machine tool companies were discussed by Mr. Berna in relation to down time. His remarks centered around a British automobile manufacturer who had installed machine tools built in England. We quote direct from Mr. Berna.

Manufacturer No. 1—"This Company furnished 34 machines for our new engine line about half of which are on the cylinder block line. These machines have been the cause of the loss of 2600 productive hours in four months or an average of 77 hr per machine."

Manufacturer No. 2—"This Company is I believe the largest manufacturer of one type of machine tool in England. In this same department there are nine of this company's machines which have caused the loss of 1800 productive hours or an average of 200 hr per machine."

Manufacturer No. 3—"This Company furnished nine machines which due to various troubles have caused the loss of 1626 productive hours or an average of 180 hr per machine. Two of these machines have caused the loss of over 200 hr each."

Manufacturer No. 4—"This Company manufactures a general purpose machine and furnished seven machines for a new engine line which have been the cause of the loss of 1966 hr on an average of 280 hr per machine."

All in all, Mr. Berna stated that Europe has made an excellent comeback and that their fostered and protected machine tool industry is bigger than ever. He stated that German machines are much more attractive than their American counterparts, and this is one place where American manufacturers might improve. However, German machine tools are equipped with too many gadgets. European machine tools do not have the weight or contain the proper materials to make them acceptable for the American market. Another piece of adverse criticism is that they lack the interchangeability of parts. As has been stated many times and again mentioned by Mr. Berna, the European tools are underpowered. In general Mr. Berna stated that the British have the best all around machine tools, and the Italians come along last.

According to Mr. Berna, the American machine tool industry must not

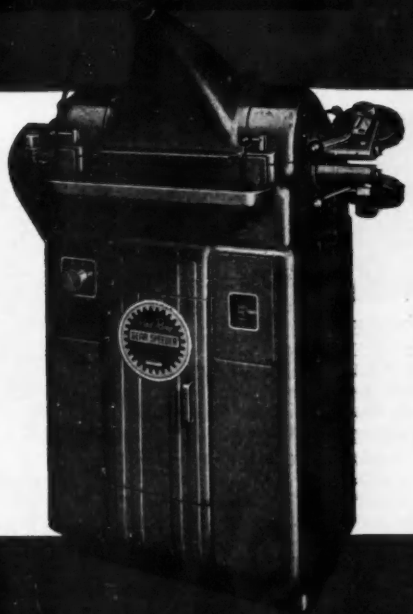
A RED RING SOUND TEST
is the Quickest Way to Screen Out
FAULTY GEARS

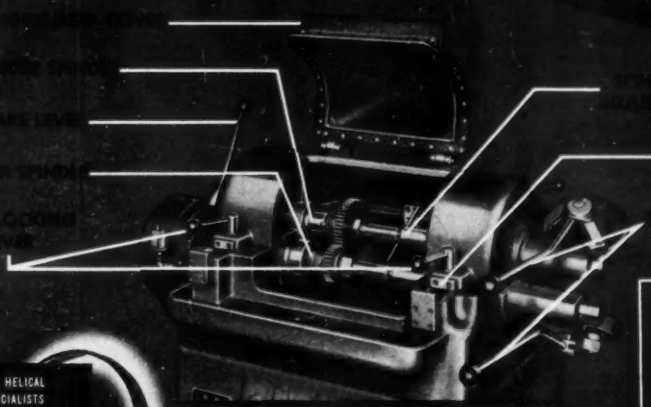
When a set of gears runs quietly and smoothly you can OK them for assembly with the assurance they will function properly in service. Such a test under varying speeds can be made easily and quickly by the average shop man.

If the sound test reveals objectionable noise the faulty gears are immediately routed back for correction. You won't waste time and expense by assembling them.

When you have a set of gears in the Sound Tester you can also check tooth bearing. Just use marking compound on one and observe its transfer to the mating gear. When the sound test reveals a nicked tooth the nick may be removed by a pencil grinder while the gear is still in the sound testing machine.

Special sound testing machines are available to meet individual requirements.





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ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORM

NATIONAL BROACH & MACHINE CO.

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WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

rest on its laurels but must improve to stay ahead. One reason alone is the fact that U. S. importers of foreign machine tools are now going at a rate of $50 million per year as compared with the pre-1950 rate of $1 million a year. His answer to this was that the Government should turn free enterprise loose.

Technical Sessions

E. J. Rivoira and J. M. Morgan presented a paper, "Electric Drive for High Speed Service Broaching Machine." The particular machine described utilizes an adjustable voltage drive and has a capacity of 150 cylinder heads per hour. Their presentation described solutions to the problems encountered in applying electric control and drives capable of developing 600 hp on the large broaching machine. It is of interest that this machine was designed to take full advantage of tungsten carbide cutting tools, thus increasing cutting speed from 40 to 200 fpm. This machine will be more fully described in an article on the Dodge Engine Plant which will appear in an early issue of AUTOMOTIVE INDUSTRIES.

In a paper entitled, "Constant Surface Cutting Speed for Lathes and Boring Mills," by John L. Dutcher, General Electric Co., it was stated that savings in machining time, improved tool life, and better work surface finish are obtained by applying automatically controlled adjustable speed drives to maintain constant surface cutting speed. Mr. Dutcher described two methods of controlling the surface speeds. One of these is the reactor control which utilizes a cam on the cross slide. The other method is a rheostat control which is driven from the feed drive. The pros and cons of both methods were discussed.

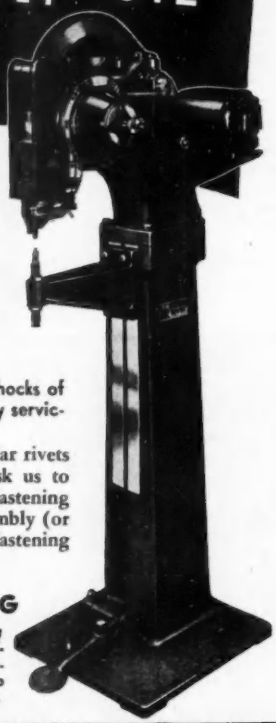
From the automobile industry, a paper was presented by William P. Curtis of the Ford Motor Co. entitled, "Safe Application of Electrical Control on Machine Tools." It was concerned primarily with hazardous conditions on machines which can be safeguarded by the electrical engineer. The presentation was intended to clarify some of the reasons why changes are requested when machine tool electrical diagrams are submitted for preliminary approval. Mr. Curtis stated that one of the major reasons for changes is the lack of specification to JIC standards which should outline additional safety requirements. He covered the control panel layout, motor circuits, interlocking of control circuits, and general safety requirements as required by the Ford Motor Co. One of the major points brought out was that not only is it necessary for a machine to operate properly but that it should be impossible for it to be operated improperly.

E. E. Opel, electrical engineer, National Automatic Tool Co., Richmond, Ind., presented a discussion of Article 670 of the National Electrical Code. He advocated a research program for adequate and practical overcurrent protection. According to Mr. Opel, the code should be written for the men who do the wiring and for the men who inspect the wiring so that each section will be definite and specific and will deal only with industrial wiring. He stated that the code should be limited to 600 volts or less.

Speaking on electric gaging, J. J. Jaeger, Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn., pointed out the many uses and future possibilities of electric gages. He also gave information on the Beta Ray gage which utilizes radioactive

(*Turn to page* 182, *please*)

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AUTOMATIC RIVET SETTER
CUTS COSTS 3 WAYS



1 FASTENS FASTER . . .
Only the speed of the operator limits the 912's riveting speed. Completely automatic. A push on the foot pedal automatically feeds, inserts and clinches the rivet.

2 DOES WORK OF SEVERAL MACHINES
Quick change rotary hopper and raceway makes the 912 adjustable in 5 to 10 minutes to set different size rivets. Adjustable anvil height and 12-inch throat provide further versatility.

3 SAVES ON MAINTENANCE . . .
The 912 is massively built to stand the shocks of constant use and is designed for quick, easy servicing and parts replacement.

If your assembly calls for 3/16" steel tubular rivets or smaller, of 15/16" lengths or less, ask us to show you how the 912 can cut your fastening costs. Send a sample of your problem assembly (or blueprint) for a free fastening analysis.



FREE CATALOG
contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

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engine pre-heating

Floods engine components, battery, crankcase, carburetor with warm, heated air. Makes starting easier, faster – even at 65° below!

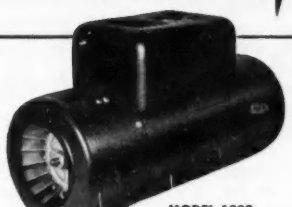
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Warm air – independent of engine heat, independent of engine operation – circulates swiftly, evenly, to keep personnel comfortable at all times.

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Keeps windshield reliably "frost-free." Assures clear vision, safer driving.



MODEL 1030

The most powerful heater for its size in the world with a usable output of 50,000 BTU's per hour! This truly compact unit, designed to meet military specifications, assures maximum vehicle and personnel efficiency under the most stringent weather conditions.

OVERALL PHYSICAL SIZE

Weight (lbs.)	23
Height (inches)	8¾
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Width (inches)	6⅞₂

Installation space (ft³) .523

WRITE TODAY for specific model information or experienced counsel on *any* phase of heating. Address inquiry to South Wind Division, Stewart-Warner Corporation, Indianapolis 7, Indiana.

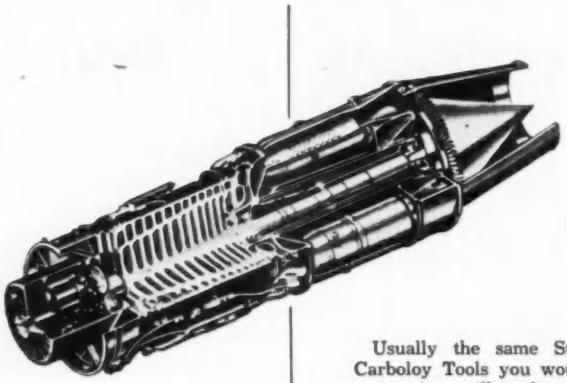
South Wind

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A PRODUCT OF SW STEWART-WARNER

PERSONNEL HEATING
ENGINE AND EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING

Why inventory hundreds when these 11 Standard up to 80% of your single-point



THE Broad Versatility of Standard Carboloy Tools and Blanks Includes Machining High-temperature Alloys

Today, titanium and most other so-called high-temperature alloys, such as those used in jet-engine manufacture, can be machined more successfully with cemented tungsten carbide than with any other cutting material . . . a great majority with straight tungsten carbide grades, such as found in Standard Carboloy Tools. Carboloy Tool engineers have intensively studied the machining of tough-alloy materials, and are able to present for your use the following:

Usually the same Standard Carboloy Tools you would use on cast iron will work very well. For heavy, rough cuts select a tough "Standard" grade. For lighter cuts, use harder, more wear-resistant grades. High-temperature alloys tend to work-harden, Standard Carboloy Tools are ideal because they hold a good cutting edge. Tools should be designed to be as free-cutting as possible; top side rake should be greater than normal, and a very small nose radius used. Cutting speeds vary widely between 75 f.p.m. and 600 f.p.m. Best feeds are .010" to .020" per revolution.

For specific, detailed advice on your particular problem, write to us, giving full details. Our engineers will promptly give you their recommendations.



of tools Carboloy tools do machining?



Standard Carboloy Tools give you top production at top speeds . . . maximum return per tool dollar

Not only do Carboloy Standards drastically cut your inventory, but actual production and cost figures compiled on an industry-wide basis in all types of shops prove beyond all question that Carboloy Tools

. . . *multiply production many times over*

. . . *diminish tool and maintenance costs*

. . . *outproduce, outlast steel tools up to 10 to 1.*

Your continuing quest for greater production at lower cost is aided by such specialized Carboloy services as these: the Customer Training School, which shows your supervisory personnel how to get the maximum results with carbides; our wide range of training material – free manuals, technical charts, slide films showing techniques, and many others; and actual on-the-job instruction and assistance by our skilled tool engineers.

Remember, too – your needs on "rush" jobs are often answered by economical Carboloy Blanks, which may be quickly and easily brazed to tool shanks without waiting for specials.

For further information, mail the coupon, or call an Authorized Distributor or a Carboloy Field Engineer. Is there a better time than NOW?

"Carboloy" is the registered trademark for the products of Carboloy Department of General Electric Company

Plants at Detroit, Michigan; Edmore, Michigan; and Schenectady, New York

AUTHORIZED CARBOLOY® CEMENTED CARBIDES DISTRIBUTORS

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY
11151 E. 8 Mile Road, Detroit 32, Michigan

Date_____

Please send me, without cost or obligation, Carboloy General Tool Catalog, GT-250.

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COMPANY .....

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CITY ..... ZONE ..... STATE .....

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Buckeye 360-cycle Right Angle Sander
(also available in 180-cycle series)

▶ SAVE $28.75

▶ on every new pinion!



Buckeye 360-cycle Straight Grinder
(also available in 180-cycle series)

On all electric tools, the pinion gear is subject to wear and replacement.

On many electric tools, replacing an inexpensive pinion also requires replacing an expensive rotor.

On Buckeye electric tools, the pinion is detachable and is easily replaced without even disturbing the rotor and shaft, which are dynamically balanced to insure smooth, quiet operation.

In short, whenever you do have to replace a worn pinion, you can save $28.75, plus a great deal of maintenance time and effort—IF you're using Buckeye electric tools.

▶ what are you waiting for?

CATALOG E-10 *contains complete information and specifications on Buckeye 360 and 180 cycle portable drills, screwdrivers, nut-runners, straight and right-angle grinders, sanders, buffers, polishers.*

Buckeye Tools CORPORATION
DIVISION 21 • DAYTON 1, OHIO

Portable Air and Electric Tools for Industry

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

(*Continued from page* 178)

material. It was pointed out that in the Beta Ray gage Strontium 90 in the form of strontium chloride is being utilized. This material has half life of approximately 50 years so that for any day-to-day usage the radiation can be considered constant. The usual gage is built as an absorption type of unit in which the radiation appearing in the ionization chamber will be a function of the weight of the material being gaged. The equipment operates by providing a variable source of radiation produced by interposing a chopper between the source and the material. This results in an alternating current in the ionization chamber. The signal is combined with a voltage which is synchronous with the chopper, the resulting signal being set to zero or to a specific value when the standard weight of material is inserted in the gage. After suitable amplification and the introduction of a phase sensitive detector, the output is usually displayed on a recording type of self balancing potentiometer. Frequently two pen recorders are used which indicate both the gage setting and the deviation, although usually it has been proved desirable in most of the non-metallic gages to have direct reading scales.

BOOKS . . .

MECHANICS, by J. L. Meriam, published by John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. Written by an associate professor of engineering design at the University of California, this two-volume text covers basic engineering mechanics. Part I treats statics, while Part II deals with dynamics. The arrangement of material has been skillfully handled and contains numerous illustrations and a large variety of problems designed to emphasize major points of interest to the student. While the work is designed specifically for learners, it may prove of considerable value to the practicing engineer as a refresher.

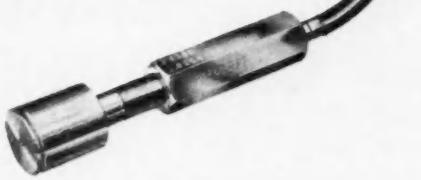
CHEMICALS OF COMMERCE, by Foster D. Snell and Cornelia T. Snell, published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y. Price, $6.50. Numerous users of chemicals, who have relied upon and consulted the earlier edition of this book, will welcome this second edition, which has been brought up to date in every respect. It includes all the new chemicals, developments, and materials of recent years. Represented in its pages are facts from pure chemistry and its applications, throughout industry drawn from periodical literature and the publications of leading manufacturers. For example, enough information is given about methods of manufacture to answer questions about the composition of various commercial grades of chemicals and related substances, and the types of impurities likely to be present. From these facts and other data given, the user can judge fairly what a product will, or will not, do. Special attention is paid to the different commercial varieties and the applications for which the product is most widely used.



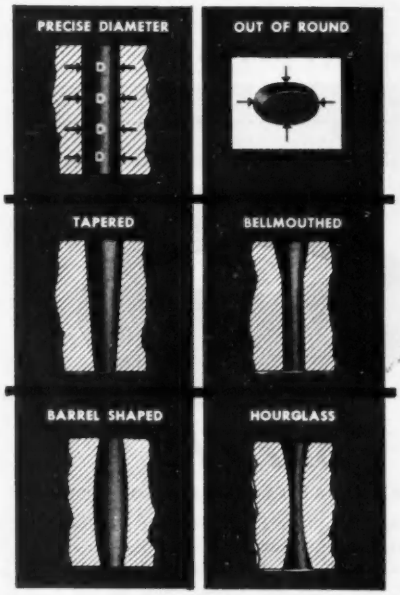
Precisionaire Spindles

SHOW YOU WHAT PLUG GAGES CAN'T

—and wear 10 to more than 100 times longer!



A PRECISIONAIRE STANDARD SPINDLE SHOWS WHETHER A HOLE IS:



A Precisionaire and *standard* spindle shows you instantly whether a hole is dimensionally O.K.—and, if not, *what* the error is, *where* it is, and *how* much.

Precisionaire spindles prevent accepting bad parts in Receiving Inspection. In Production Inspection they show when and how to adjust a machine *before* scrap is produced. They prevent passing incorrect parts in Final Inspection.

Other Precisionaire spindles and fixtures for single and multiple gaging of internal and external diameters, squareness, concentricity, center distance, etc., are readily available.

A PLUG GAGE SHOWS YOU ONLY

Whether the hole being checked will assemble with a mating shaft of known diameter—it cannot measure any condition shown at the left.



Stock Delivery on Precisionaires—4 weeks delivery on Standard Spindles and Master Settings Rings Sizes .125 to 4.000". See your Sheffield Representative or write for new Precisionaire Catalog.

4947

MASTER CRAFTSMEN SHEFFIELD HEADQUARTERS

the *Sheffield* CORPORATION

CORRECT | RELIABLE

C/R

When correct design and dependable performance are especially important, you can depend on Chicago Rawhide for reliable solutions to your mechanical sealing and protection problems.



C/R Oil Seals

The "Perfect" answer to fluid retention, moisture and foreign matter exclusion, and similar mechanism protection problems. Used more than any similar device in motor vehicles, industrial machines, farm implements, and road machinery. Stocked in over 1800 sizes, covering 16 different types.

Write for "Engineering with C/R Oil Seals."



SIRVENE

SCIENTIFICALLY COMPOUNDED ELASTOMERS
(Synthetic Rubber)

When you need an oil-resistant, pliable part with an exact degree of flexibility, hardness, resistance to extreme temperatures, fluids, gases, abrasion and wear . . . whether it be an intricately designed diaphragm or boot . . . or a simple but critical packing or gasket . . . Sirvene will serve you dependably.

Write for "Engineering with Sirvene."



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Actual tests prove Sirvis packings require less replacement than any other type. Made in a complete line of cup, flange, U and V types from specially treated and tanned steerhide. Available in special designs, scientifically engineered to solve unusual situations.

Write for Sirvis Mechanical Leather Catalog.

C/R

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Automobile Builders, Suppliers Have Many New Devices Coming

(*Continued from page* 19)

claimed to have great durability and long life.

With both General Motors and Chrysler planning to offer air-conditioning systems on some 1953 lines, it is certain that a competitive battle over the merits of the two systems will develop. It not only will involve claims of cooling capacity but also the merits of the location of ducts through which the cool air enters the car. The Chrysler design uses an inlet located on the shelf back of the rear seat and sends the air upward along the roof of the car. The General Motors system uses a duct location above the side windows to vent the cooled air into the car.

Mechanical Power Steering

A large automotive supplier is demonstrating a mechanical power steering unit which would have the obvious advantage of being lower in cost. It is said to involve a power drive connected with the engine and using friction clutches actuated by linkage to the steering column.

At least one car manufacturer will offer a package deal on chrome appointments as an option on its 1953 models. The customer will have a choice of various chrome plated ornaments, such as moldings and other decorative parts. One of the large automobile companies has an outside rear view mirror adjustable in both vertical and horizontal planes from inside the car. It will sell for less than $10.

A large manufacturer of automatic transmissions has under development a low cost automatic drive designed for the low-priced field, such as Henry J, Aero Willys, and Nash Rambler. It is understood to have a fluid coupling and a 3-speed gear box.

Improved Tires

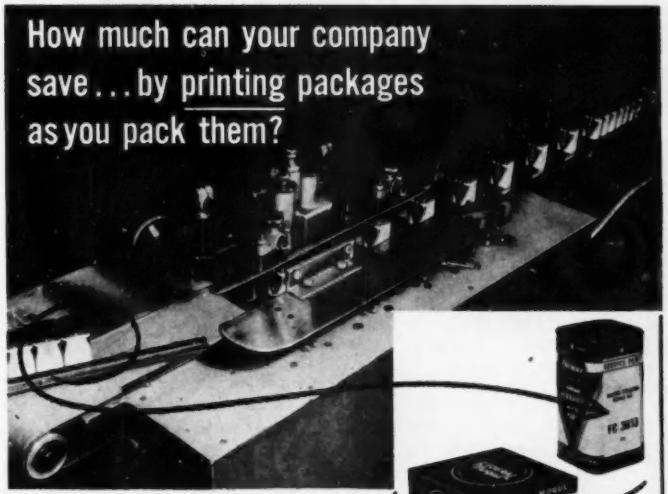
The prospect of longer lasting and improved rubber products was held out by Du Pont chemists. They told a session of the division of rubber chemistry of the American Chemical Society at Buffalo, N. Y., two weeks ago that a new Du Pont rubber-like material looks like the answer to attack by ozone, a primary cause of deterioration in natural and many types of synthetic rubbers. The material, known as Hypalon S-2 chlorosulfonated polythene, was introduced by Du Pont a few months ago and is being made in semi-commercial quantities.

Hypalon S-2 has been exposed in the laboratory to air containing more than 1350 times normal concentration of ozone without showing a single crack, and, in fact, has never been found to fail in ozone, the chemists said. A rubber widely used in automobile tires, blended with 25 per cent of the new material and put under strain comparable to that in a tire sidewall, showed no sign of cracking after four months' exposure to a degree of ozone concentration found only in a few sections of the country. Under corresponding conditions, the same rubber, without the elastomer in it, showed ozone cracks within 24 hr, as did natural rubber.

First report of a new type of GR-S synthetic rubber, now in the pilot plant stage, also was made at the Buffalo meeting. The new rubber was developed by the Naugatuck Chemical Div., United States Rubber Co. Laboratory tests show that the new synthetic gives 30 to 50 per cent more

(*Turn to page* 186, *please*)

How much can your company save . . . by printing packages as you pack them?





Do you use completely preprinted packages for each individual part or accessory you make? Or do you use a common package for a variety of products, imprinting or labeling it in a separate operation? Either way you can cut costs considerably and do a more efficient job with a Gottscho MARKOCODER automatic package printing machine.

Set up in either a hand-pack or mechanized packaging line the MARKOCODER prints name, number, model application, other product identification on one or more blank panels of a partially-printed container . . . *automatically* . . . as an integral packaging function. It delivers accurately registered "print-quality" impressions on cartons, boxes, cans or canisters . . . on top, ends or bottom — permits quick, easy changeover for new copy, packages of different size.

Find out how other packagers of parts and accessories are using the Gottscho MARKOCODER to slash package inventories and save storage space, eliminate a cause of production line down-time, reduce packaging labor costs, reduce cost of packages, cut losses from package obsolescence, simplify inventory control, etc. *Send for our MARKOCODER Brochure "APM" today.*

Gottscho

ADOLPH GOTTSCHO, INC., Hillside 5, N. J.

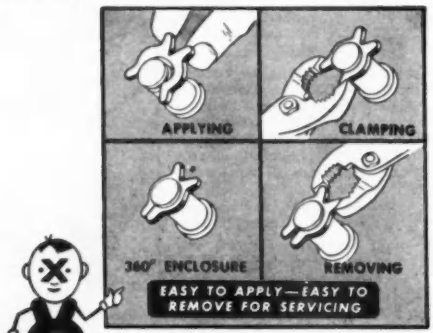
Machines to MARK whatever you MAKE



Standard X-WASHERS

● If you have a design problem involving fasteners, make STANDARD X-WASHERS the profitable solution. The split-second locking action of STANDARD X-WASHERS will slash production time and costs.

Remember, no *special* tools are needed. A pair of pliers presses STANDARD X-WASHERS to a positive 360° enclosure and removes them just as easily when servicing is necessary. Fit them into your designs. Their applications are numerous.



FREDDIE FASTENER TALKIN': We can provide grooved pins for all sizes of STANDARD X-WASHERS... parallel or headed type pins made to specifications. Send print... or write for X-WASHER catalog and order by number. You'll receive a prompt quotation.

STANDARD Locknut and Lockwasher, Inc.
510 N. CAPITOL AVE. • INDIANAPOLIS 4, IND.

(*Continued from page* 185)

abrasion resistance than standard cold rubber. It also has good resistance to heat, cracking caused by rapid flexing, and the deteriorating effects of aging in air.

Preliminary road tests for tires made with the rubber appear to be confirming the improvements found in the laboratory, although no final answer has yet been determined. The new rubber is made possible by the addition of rosin chemicals, by-products of turpentine manufacture, to an extra tough cold type of GR-S synthetic rubber.

Packaging Award

Wilburn Couch, package and container designer for General Motors Corp., has won his thirteenth packaging citation in five years by winning first place for export packaging at the Industrial Packaging and Materials Handling Exposition. He won the award for a new way of packaging sealed beam headlights, which not only gives greater protection against damage but also is much faster, resulting in lower costs. It consists of using a specially designed metal-end container for protection and suspending the lamp by means of fibre board inserts within the container, which is sealed by machine to keep out moisture. Under the new method, 450 units an hour can be packaged compared with only 125 units under the old method, which consisted of wrapping the lamps in treated paper, placing them in moisture resistant bags, and packing in weather proof fibre board carton that was sealed by hand.

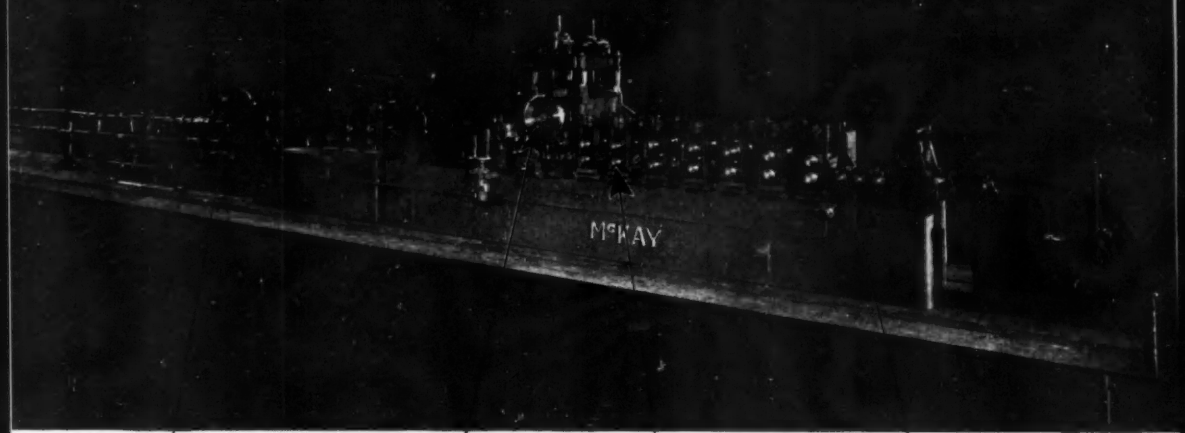
SAE Nominees

Ballots for use in electing 1953 officers of the SAE were mailed to members recently. Closing date for voting is Nov. 30. Nominees are as follows: Annual nominating committee, for president, Robert Cass; for councilors, C. A. Chayne, W. S. Cowell, J. L. S. Snead, Jr.; for treasurer, B. B. Bachman; for vice-presidents of activities—air transport, O. E. Kirchner; aircraft, T. T. Neill; aircraft powerplant, E. G. Haven; body, H. E. Chesebrough; Diesel engine, J. W. Pennington; engineering materials, G. C. Riegel; fuels and lubricants, F. A. Suess; passenger car, J. H. Booth; production, N. P. Petersen; tractor and farm machinery, C. T. O'Harrow; transportation and maintenance, O. A. Brouer; truck and bus, N. R. Brownyer.

WHY DO McKAY MACHINES REQUIRE

Less Maintenance?

McKAY RESISTANCE WELD TUBE MILLS



CUT OFF SYNCHRONIZED WITH MILL SPEED TUBING CLAMPED BOTH SIDES OF CUT

ALL SHAFTS ALLOY STEEL HEAT TREATED ANTI-FRICTION BEARINGS THROUGHOUT

ALLOY GEARS FORCE LUBRICATED NO-OVERHUNG GEARS ALL MAIN ROLLS DRIVEN

McKay offers a complete line of Resistance Weld Tube Mills for producing from ⅜" dia. tube to line pipe. McKay McKrometer adjustment of roll pressures facilitates set ups and speeds change over. Mail your inquiries to McKay Machine Co., Youngstown 10, Ohio

McK McKAY

U·S·S Carilloy steel springs soak up

Alloy springs cushion tremendous mechanical shocks in 200-ton short-circuit generators ...save expense of forgings

IN testing high-voltage circuit breakers, engineers at General Electric Company *intentionally* short-circuit two huge motor-driven generators. Each of these test generators is normally rated 125,000 kva, but provides short-circuit currents as high as 182,000 amp, instantaneous, offset wave, corresponding to about 1,625,000-kva rms symmetrical short-circuit duty. Such operation causes tremendous mechanical stresses to build up inside each machine. These stresses create a torque that tries to twist loose the 200-ton stator assembly. But no damage is done! These powerful machines are mounted on U·S·S CARILLOY steel plate springs that cushion the shock and then damp out any vibrations that follow.

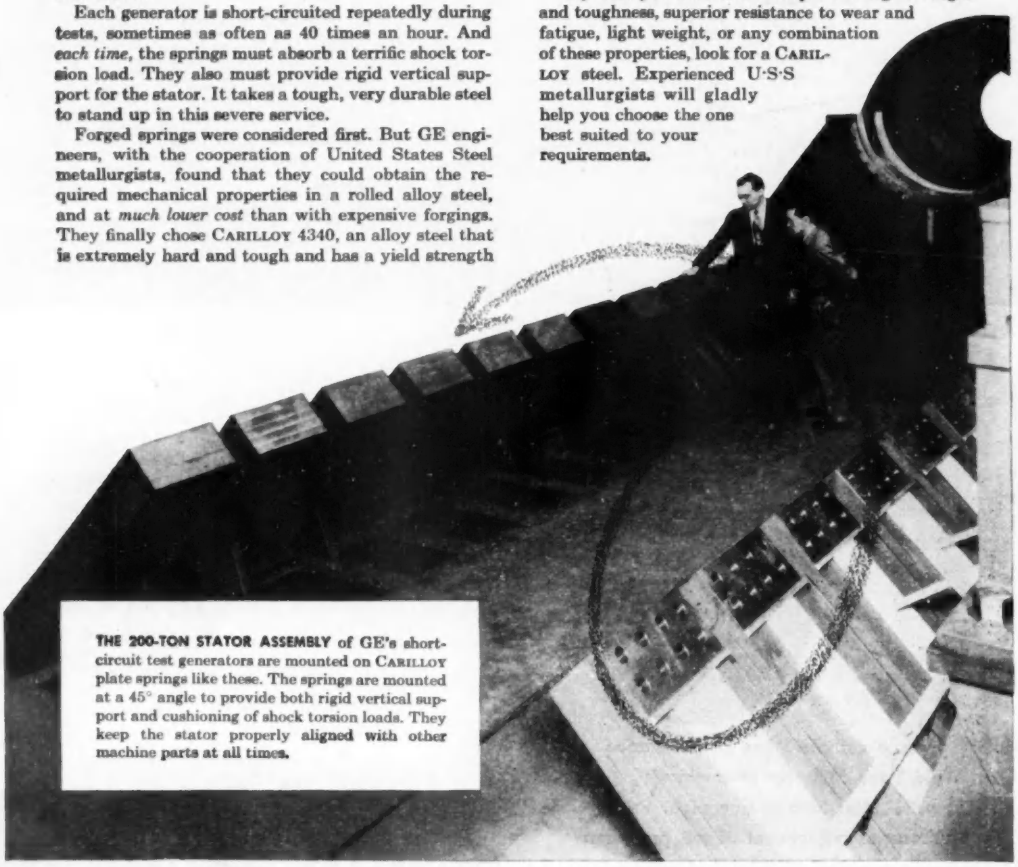
Each generator is short-circuited repeatedly during tests, sometimes as often as 40 times an hour. And *each time*, the springs must absorb a terrific shock torsion load. They also must provide rigid vertical support for the stator. It takes a tough, very durable steel to stand up in this severe service.

Forged springs were considered first. But GE engineers, with the cooperation of United States Steel metallurgists, found that they could obtain the required mechanical properties in a rolled alloy steel, and at *much lower cost* than with expensive forgings. They finally chose CARILLOY 4340, an alloy steel that is extremely hard and tough and has a yield strength of about 100,000 psi. This insures good endurance at 40,000 psi as required in this rugged application.

Also important was the fact that CARILLOY 4340 is easy to heat treat. Plates were furnished to GE quenched, tempered, and special cut and stress relieved.

This steel is giving excellent service. Initial vertical displacement of each generator was only 0.35 mils. Under the most severe short circuit, developing a whopping *8 million lb. ft.* of torque, frame rotation is about ½ in. each way at the point of attachment of the springs. The axial centerline of the machine stays within 30 mils of its normal position. These movements are sufficient to cushion the shock effectively.

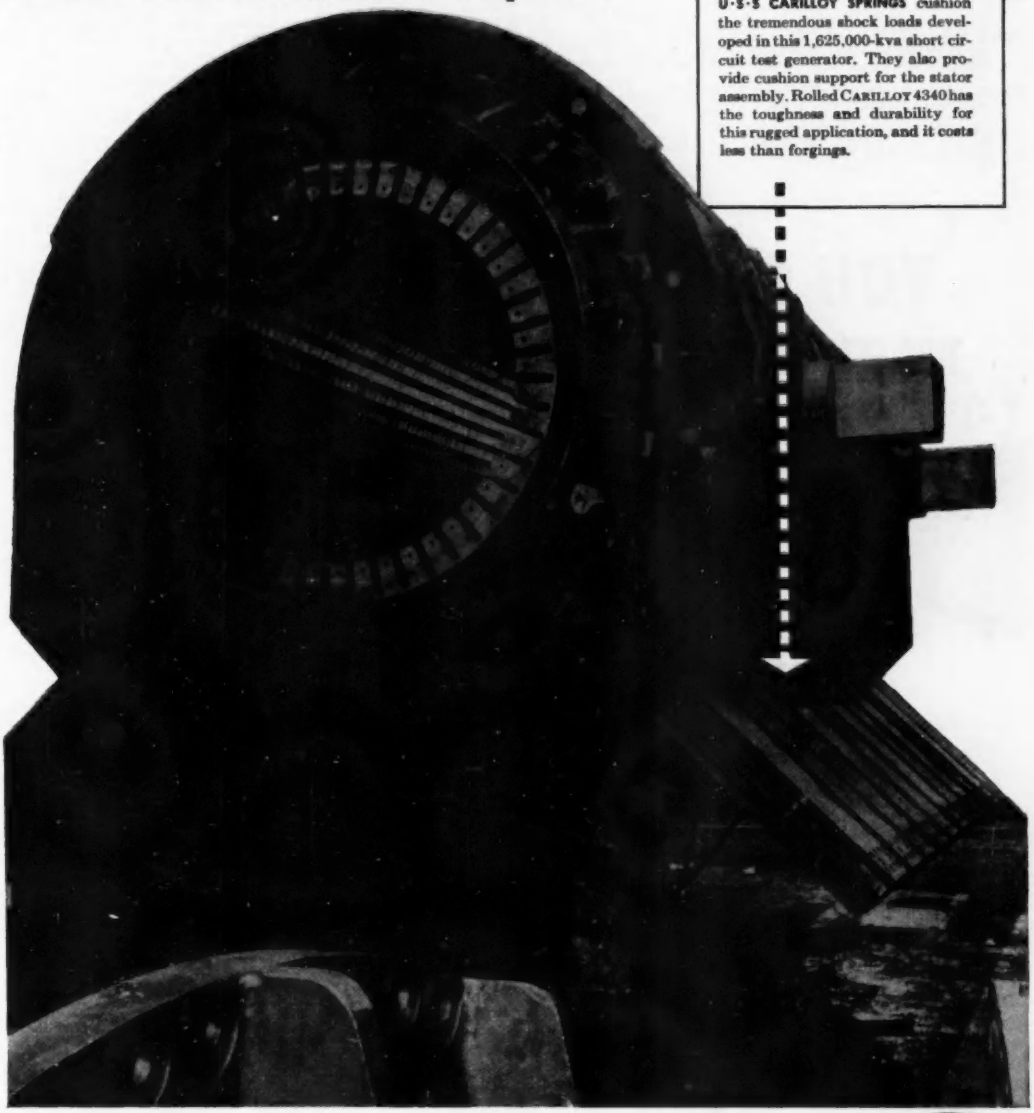
Any time you need a steel to provide high strength and toughness, superior resistance to wear and fatigue, light weight, or any combination of these properties, look for a CARILLOY steel. Experienced U·S·S metallurgists will gladly help you choose the one best suited to your requirements.



THE 200-TON STATOR ASSEMBLY of GE's short-circuit test generators are mounted on CARILLOY plate springs like these. The springs are mounted at a 45° angle to provide both rigid vertical support and cushioning of shock torsion loads. They keep the stator properly aligned with other machine parts at all times.

8 million lb.-ft. torque!

U·S·S CARILLOY SPRINGS cushion the tremendous shock loads developed in this 1,625,000-kva short circuit test generator. They also provide cushion support for the stator assembly. Rolled CARILLOY 4340 has the toughness and durability for this rugged application, and it costs less than forgings.



U·S·S Carilloy Steels

USS

UNITED STATES STEEL COMPANY, PITTSBURGH · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

2-1949

UNITED STATES STEEL

CALENDAR

OF COMING SHOWS AND MEETINGS

AIEE Technical Congress on Instruments, Hotel Ben Franklin, Phila., Pa. .....Nov. 17-18

Third Annual Mexican Road Race, El Ocotal-Nogales .....Nov. 19-24

7th Midwest Conference, American Society for Quality Control, Claypool Hotel, Indianapolis, Ind. .....Nov. 20-21

American Standards Association, 34th Annual Meeting, Hotel Waldorf-Astoria, New York, N. Y. .....Nov. 25

ASME annual meeting, Hotels McAlpin and Statler, New York, N. Y. .....Nov. 30-Dec. 5

Society for Experimental Stress Analysis, Annual Meeting and Exhibition, Hotel McAlpin, New York, N. Y. .....Dec. 3-5

National Standard Parts Association Congress, Ambassador Hotel, Atlantic City, N. J. .....Dec. 8-9

Automotive Service Industries Show, Atlantic City, N. J. .....Dec. 10-13

1953

43rd National Motor Boat Show, Grand Central Palace, New York, N. Y. .....Jan. 9-17

SAE Annual Meeting, Sheraton-Cadillac Hotel, Detroit, Mich. Jan. 12-16

Brussels Automobile & Truck Show, Brussels, Belgium. Jan. 17-28

Plant Maintenance Show, Public Auditorium, Cleveland, Ohio Jan. 19-22

30th International Automobile Show Pacific Auditorium, Los Angeles, Calif. .....Jan. 30-Feb. 8

Western Computer Conference, Hotel Statler, Los Angeles, Calif. .....Feb. 4-6

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y.....Feb. 24-27

Pacific Automotive Show, Civic Auditorium, San Francisco, Calif. .....Feb. 26-Mar. 1

American Society for Testing Materials, Spring Meeting, Detroit, Mich. .....Mar. 2-6

Geneva Automobile & Truck Show, Geneva, Switzerland ...Mar. 5-15

National Association of Corrosion Engineers Ninth Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill.....Mar. 16-20

German Vehicle Show, Frankfort, Germany .....Mar. 19-29

Eighth Western Metal Congress, Pan-Pacific Auditorium, Los Angeles, Calif. .....Mar. 23-27

2nd Annual International Motor Sports Show, Grand Central Palace, New York, N. Y..Apr. 4-12

Auto-Lite Easter Automobile Show, Waldorf-Astoria, New York, N. Y. .....Apr. 6-11

Fifth Materials Handling Exposition, Convention Hall, Philadelphia, Pa. .....May 18-22

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J.....June 29-July 3

Eighth National Instrument Conference and Exhibit, Chicago, Ill. .....Sept. 21-25

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THIS FEATHERWEIGHT COATED FABRIC



..it's VULCAN "COVERLIGHT"

Here's what you have been waiting for — a new and revolutionary lightweight coated fabric for scores of industrial applications.

Vulcan's newly developed **"COVERLIGHT"** combines extremely light weight (only 5½ ounces per square yard) with exceptionally high resistance to tearing. Tensile strength also is unusually high.

"COVERLIGHT" is especially useful in aircraft and aviation applications, such as wing covers, engine covers, tail surface covers, baggage tarpaulins, control surface seals, etc. It is used as a protective covering for any kind of machinery, automotive tarpaulins, light weight carrying cases, protective covering for sports fields, etc.

"COVERLIGHT" is a nylon fabric, coated with synthetic rubber. Get your sample of this "featherweight" waterproof fabric that is so tough you can't tear it. Also available in 6½, 10, 12 and 14 ounce per square yard. *Write for complete specifications and samples.*

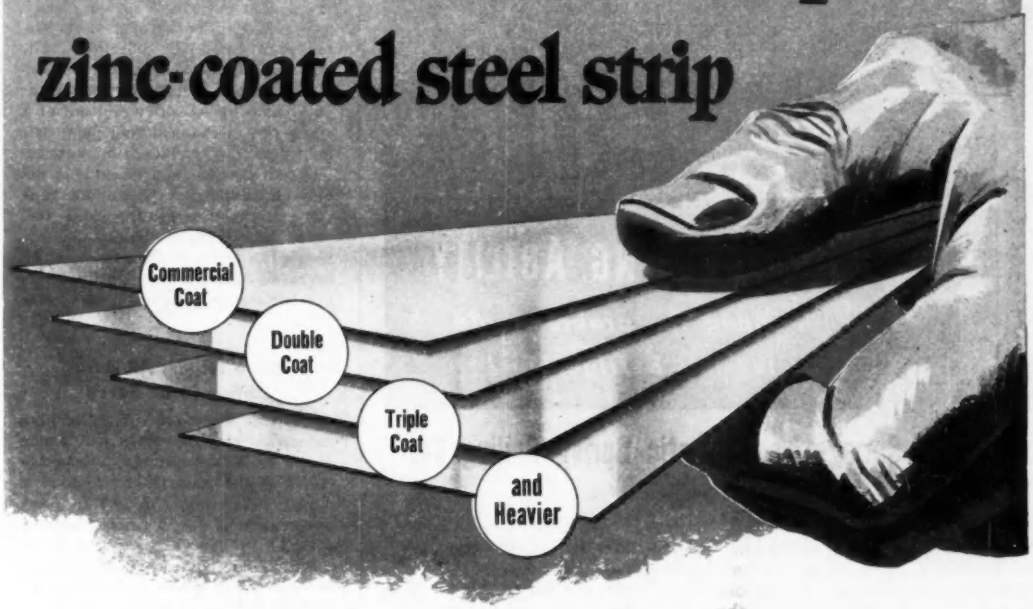
VULCAN RUBBER PRODUCTS, INC.

58TH STREET AND FIRST AVENUE, BROOKLYN 20, N. Y.

BOOKS...

1952 MODERN PLASTICS ENCYCLOPEDIA AND ENGINEER'S HANDBOOK, published by Breskin Publications, 575 Madison Ave., New York, N. Y. Price, $2.00. Designed as a working guide to all phases of plastics production and material selection for those using or contemplating the use of plastics products or components, this 848-page volume also presents a complete review of the technical advances made in the plastics industry during the past year. All commercially available plastics materials with special emphasis on their suitability for specific end uses are covered. The requirements of operating and engineering personnel are treated in chapters on molding, extruding, casting, fabricating, finishing, and assembling operations and the machines and equipment now available for plastics processing. Numerous charts and tables contain complete chemical formulas, physical and chemical properties, and ASTM specifications. A 132-page buyer's guide is also included.

Now you can get heavier than commercial electro-plated zinc-coated steel strip



When your production standards demand extra protection from corrosion you can get it now with the *double, triple,* and even *heavier* electrolytic zinc coated Thomas Strip. This cold-rolled strip steel has a dense, uniformly distributed peel-proof zinc coating that adds substantially to product life and appearance. Coated edges can be furnished in most sizes.

In addition to the extra heavy zinc coatings, Thomas has facilities to handle the heavier gauges of strip in coils or cut lengths—thickness limits up to .125″ (full range .005″ to .125″)—widths ¼″ to approximately 22″.

Thomas electro-plated zinc strip may be formed, bent, and drawn without affecting the bond or causing flaking. Now it is available in *commercial, double, triple,* and *heavier coatings.* It can be furnished bonderized in strip thicknesses of approximately .050 and lighter to provide extra adherence for paint, lacquer, and enamel. To learn how to put extra quality into your products with precoated Thomas Strip write today.

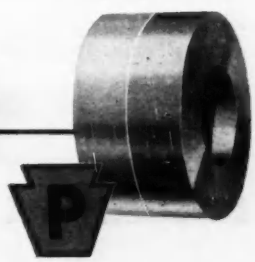
Cold-rolled strip steel electrolytically precoated with Zinc, Copper, Brass, Nickel, Lead-Alloy, and Chromium in Natural, Planished and Buffed Finishes—Hot Dip Tin and Lead Alloy Coated—Lacquer Coated in Colors—Annealed Spring Steel—Alloy Strip Steel—Uncoated Strip Steel. Carefully produced to your specifications.

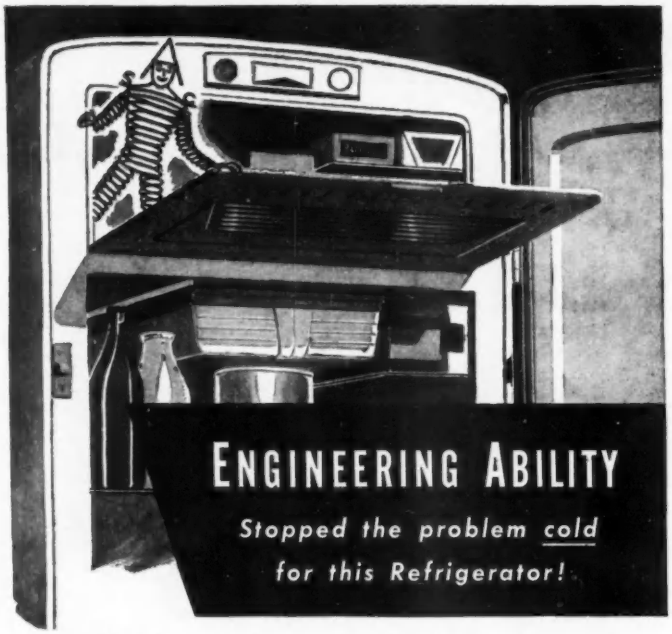
Thomas Strip

a product of

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Thomas Strip Division • Warren, Ohio





. . . with Springs by Automatic Spring Coiling Co.

The need was very specific—

"Give us a spring," this refrigerator manufacturer requested, "that can THINK . . . so to speak. We have an evaporator door to the cold chest compartment that must respond to the touch of a finger, swing open to a certain angle, and stop there. It should also be possible to close the door with a nudge of a food-burdened housewife's elbow."

So . . . Automatic Spring Coiling Co. was called in and *Engineering Ability* came through!

The answer . . . calculated by our engineers . . was to design a spring with precisely the right *build-up*, with just the right combination of spring and wire diameter. In this way, not only would the spring do the required job—metering out its energy at the right rate—but also tolerances would be such that production could be handled with facility on our high speed equipment.

Put Automatic Spring Coiling Co. to work on *your* spring problem. See how members of our entire organization—consultants, designers, sample-makers, inspectors—swing into operation and *click*. Working as a well-integrated team with strict adherence to Quality Control we pledge ourselves to bring you the finest, most dependable springs to insure the successful and efficient performance of your product.

Our veteran consulting engineers are ready to survey your requirements without obligation. Please write.

AUTOMATIC SPRING COILING CO.
4048 West Thorndale Avenue
CHICAGO 30, ILLINOIS

Industry News

(*Continued from page* 23)

Smithsonian Institution Gets First AC Fuel Pump

AC Div. of General Motors Corp. has presented the first mechanized fuel pump ever built to the Smithsonian Institution as part of its historical automotive collection. The pump was presented on the 25th anniversary of the introduction of the fuel pump by AC. Development of a successful mechanical fuel pump has had significant influence on automobile performance and design. It not only eliminated the old vacuum tank or necessity for gravity feed fuel tanks located above the engine but also led to use of overhead valves and overhead carburetion resulting in greater engine power and fuel economy.

Dave Wilkie, AP Auto Editor, to be Feted

Representatives of the automotive industries and the press will honor David J. Wilkie, veteran automotive editor of the Associated Press, at a dinner in Detroit Nov. 24 in commemoration of his 50 years of service with AP.

Mr. Wilkie joined AP at the age of 14 as a messenger boy earning $4 a week. He was an intimate friend of the late Henry Ford, and at the time of the latter's death he spent nine hours straight at his typewriter preparing copy dealing with Ford's life and activities. He wrote entirely from memory and did such an accurate reporting job that he was cited by the AP management for his outstanding performance, which could have been handled by no one else.

Industry Cool to National Show

Although there is considerable talk among dealers about a national automobile show, manufacturers have shown little interest in it as yet. Apparently there is some disagreement among the companies as to the actual need for a show, and also where to have it. Companies with no particular sales problems are not interested, but a tough competitive selling year might change their minds. One problem that would have to be met involves new model announcement times, which now string out over several months. It is felt that Detroit does not have indoor facilities for such a show.

(*Turn to page* 194, *please*)

THEIR ACCEPTANCE PROVES THEIR WORTH

DUREX-100 ENGINE BEARINGS



Leading makers of cars and trucks have accepted Durex-100 as original equipment. This acceptance proves far better than claims the dramatic superiority of these advance-type engine bearings. The *difference* between the Durex-100 and conventional bearings is their greater endurance and longer life.

In making Durex-100 bearings, the steel back is covered with a layer of metal powders that are sintered to form a porous matrix firmly brazed to the steel back. A high-lead babbitt is then mechanically and metallurgically bonded to the matrix.

This exclusive Durex-100 matrix makes the difference. This matrix provides greater embedability — actually absorbs abrasive particles; protects the bearing and the crankshaft from possible serious damage.

We'd like to tell you a fuller story of Durex-100 bearings and how they can be used to advantage in your engines.

MORAINE PRODUCTS
DIVISION OF
GENERAL MOTORS
DAYTON, OHIO

Industry News

(*Continued from page* 192)

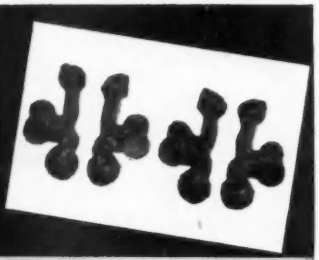
Autocar, Twin Coach Net Below Last Year

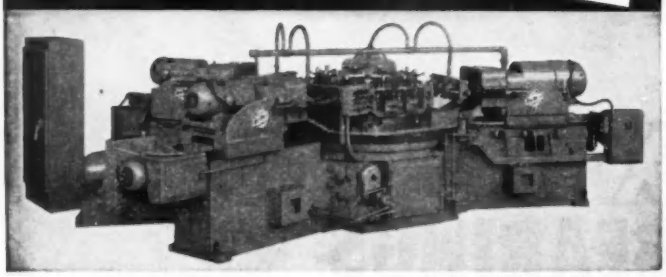
The Autocar Co. report net sales of $23,428,779 for the first nine months of the year compared to $26,226,051 for the same period last year. The three-quarter statement released by the company shows net profit (after estimated taxes on income) of $172,078 for the period compared to $935,058 for the first three quarters of 1951. Earnings per common share are 22 cents against $1.61.

A net profit of $51,000 for its third quarter operations was announced last month by the Twin Coach Co. This brings the company's total 1952 net earnings to Sept. 30 to $586,000 or $1.04 per common share, after provision for preferred dividends. In the like 1951 period, the company showed a profit of $665,000. Third quarter sales were $8,068,000 to bring the nine months' total to $33,222,000. The latter represents an increase of almost $9 million over 1951.

Drilling and Reaming

388 KING PIN HOLES PER HOUR





Station Type Indexing Machine for drilling and reaming king pin holes.

On a Davis & Thompson 5 Station Machine

This type MDT FIVE STATION INDEXING DRILLER has five fixtures mounted on the index table. Each of these fixtures holds 2 RH and 2 LH automobile front suspension support arms. Four ROTO-MATIC Power Heads, each having four spindles, perform the following operations:

1. Drill 53/64" dia.—Half way through.
2. Drill .823" dia. — Balance of way through.
3. End Cut Ream .8547/.8550" — Full length of hole.
4. Finish Ream .8635/.8637"—Full length of hole.
5. Load and Unload.

Two RH and two LH pieces are completed at the end of each cycle. Cycling is automatic, and, operator loads and unloads during machine cycle.

4 New Davis & Thompson Mechanical Power Heads

Included in the design of this machine are the new ROTO-MATIC Mechanical Electrical Power Heads operated through screw feed. An important safety feature of these units is the patented overload release clutches on the feed. Because of the simplicity of their design the units require a minimum of servicing.

Free Data

Will be furnished on request.

DAVIS and THOMPSON Roto-Matic

Davis & Thompson Company

6411 W. BURNHAM ST., MILWAUKEE 14, WISCONSIN

Film on Diesel Racer

Cummins Engine Co., Inc., announces the completion and the release of a 45 min, 16 mm film, photographed in color, entitled "Diesel Race Car."

This movie, now available to business, trade and educational groups for showing without charge, traces the development of Cummins Diesel Special No. 28, from an idea through the 1952 Indianapolis 500-Mile Memorial Day classic. Cummins Diesel Special No. 28 won the coveted pole position for the 500-mile race with a record breaking four lap qualification speed of 138.010 mph.

Plant for Vermont

Simmonds Aerocessories, Inc., announced this month that construction has started on a new plant in Vergennes, Vt., for the precision manufacture of high priority aircraft electronic and mechanical equipment. The new unit is the first of a contemplated section building which will ultimately include the engineering and administrative activities of the Simmonds Vergennes manufacturing operations.

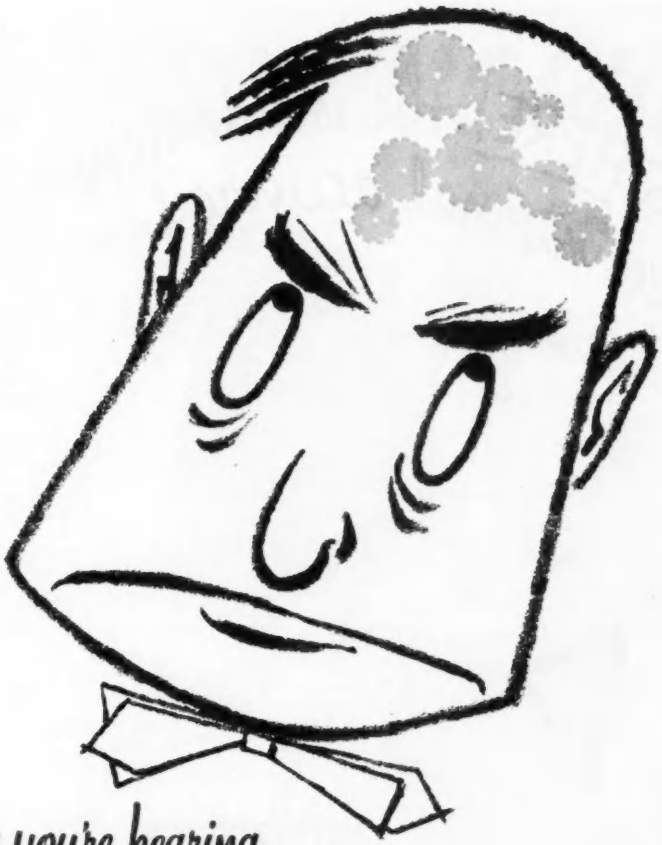
Simmonds now has two assembly plants and an engineering laboratory in operation in Vergennes. The firm is in quantity production on a varied line of precision aircraft equipment, including aircraft fuel gages, and spark plugs.

Hydraulic Conference

The second Transport Aircraft Hydraulic System Conference took place Oct. 28-29 at Detroit. There were 92 participants representing 51 industry organiations at this meeting which was sponsored by Vickers, Inc. Twenty-five airlines (nine foreign), and 11 airframe manufacturers, including four foreign, were on hand. Inquiries from the airline participants, together with military suggestions, formed the agenda outline.

A most interesting late addition to the agenda was a report describing the hydraulic systems on the DeHavilland "Comet," operated by BOAC. In the five hydraulic systems (two of them auxiliary), there are 13 accumulators in the hydraulic system and powered by seven hydraulic pumps. All of the control surfaces are operated by doubly protected hydraulic servos. With about 5000 flying hours accumulated on seven airplanes up until Oct. 15. no hydraulic problems had been encountered.

(*Turn to page* 196, *please*)



If it's gearing you're hearing

...TRY C-D-F CELORON



Light weight: ½ weight of Al, 1/7 weight of brass. Lighter, more modern gears for modern machines.



Easy to Machine—use a hobber, milling machine or gear cutter. Machines fast — save money on every blank cut!



Tensile strength of 10,000 lbs. per inch—yet has resilience. Resists corrosive chemicals.

• Noisy clashing gears mean loss of efficiency—design weakness—maintenance trouble spots—that's why designers "build in" gear reliability with C-D-F Celoron gears.

Silent Celoron is the hi-strength, non-metallic thermosetting plastic gear stock that is standard for automotive timing gears, textile machinery, printing presses and thousands of other uses.

Your C-D-F sales engineer is a good man to know (offices in principal cities). Consult with him on your gear problems. He'll save your time and money. Call him today.

CDF

Continental-Diamond Fibre Company

GENERAL OFFICES:

NEWARK 2, DELAWARE

IT'S HERE! the inside story on internal accuracy...





SIMONDS ABRASIVE CO.

Grinding Wheels

Here's the *right* start for an *exact* finish . . . Simonds bulletin on internal grinding wheels. It tells you *why* they're right . . . *why* they grind fast and cool . . . *why* they give the same high precision each time you order them.

You can have this bulletin free, together with the name of your Simonds distributor. He can supply you with Simonds Abrasive Company grinding wheels for every job . . . snagging, finishing, sharpening, cutting-off and polishing.

Write requesting bulletin ESA-29.

SIMONDS ABRASIVE CO. PHILADELPHIA 37, PA. BRANCH WAREHOUSES CHICAGO DETROIT BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co. Ltd., Arvida, Que.

Industry News

(*Continued from page* 194)

SAE Holds Transport, Diesel, Fuels Meetings

Operating problems with synthetic lubricants and with Diesel engines of various types, and weight-saving methods of truck design were some of the many topics considered at three SAE National Meetings during the past month. Certain papers presented at the Transportation meeting Oct. 22-24 at Pittburgh, Pa., and the Diesel Engine meeting at St. Louis, Mo., on Oct. 30-31 will be abstracted in future issues of AUTOMOTIVE INDUSTRIES.

Lubricating oils to overcome the rust problem in idle aircraft piston engines were reported by the Standard Oil Development Co. at the Fuels and Lubricants meeting at Tulsa, Okla., held Nov. 6-7. A new laboratory test was described, which speeded development of oils using an ashless inhibitor to prevent rust in engines stored at high temperatures and humidities.

A report of cold weather starting and warmup tests was made by the motor fuels division of CRC, covering work done for the Ordnance Dept. at Devil's Lake, N. D., last winter. In another paper, results of winter tests with polypropylene glycol synthetic oils were reported by the California Research Corp.

A universal test engine to cover all aspects of lubricating oil behavior in both spark-ignition and Diesel engines is possible, according to representatives of the Anglo-Iranian Oil Co., Ltd. They discussed the variables involved and emphasized the importance of temperature determination of various parts of a test engine.

Dow Now Palletizing Magnesium Ingots

Dow Chemical Co. now is palletizing all shipments of magnesium alloy ingots weighing approximately 42 lb at no extra charge. Shipments of regular notched primary magnesium ingots weighing approximately 20 lb also may be shipped palletized at an extra charge. Companies not equipped for mechanical handling can unload ingots in the usual manner after cutting the straps of the pallet.

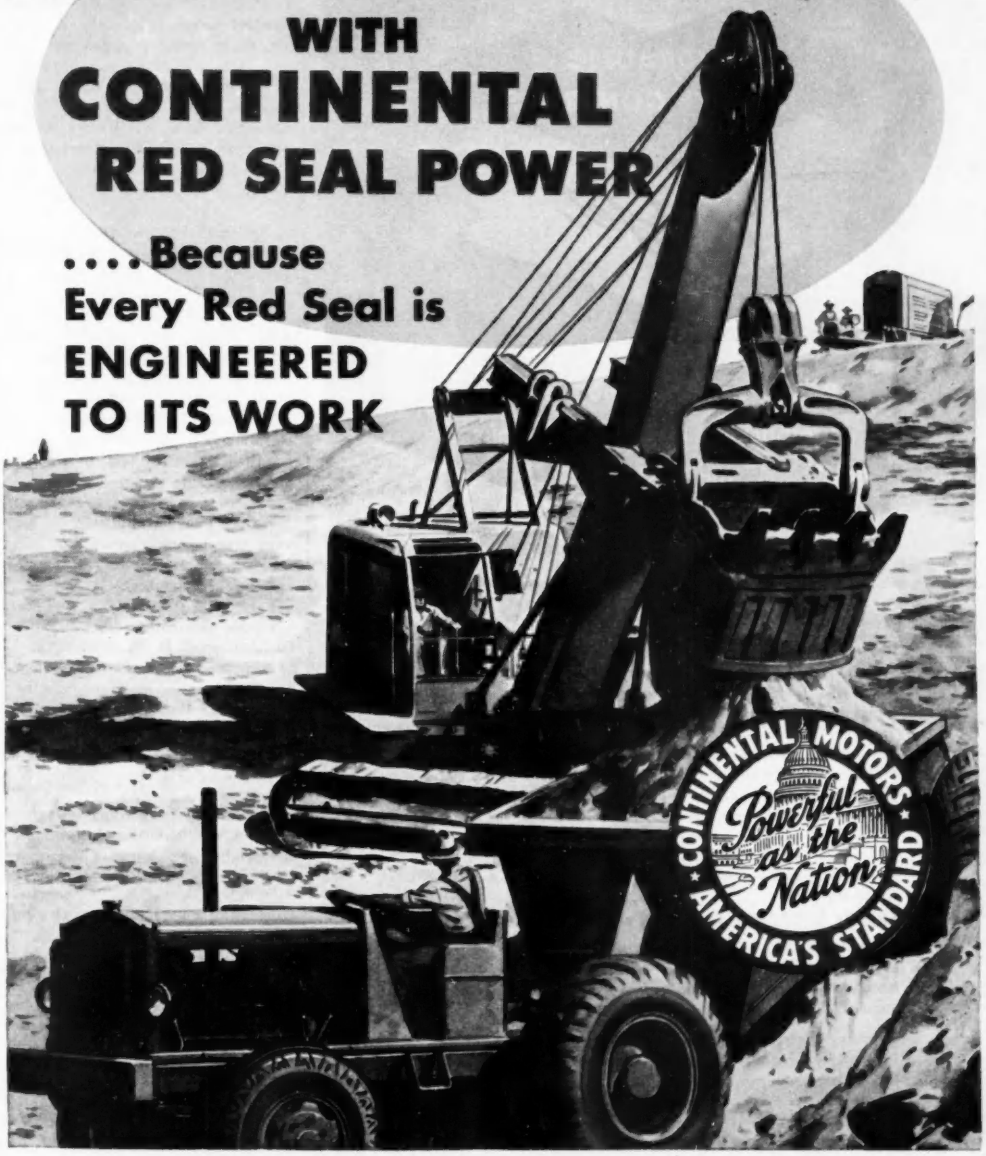
No-Shift Trucks

Ford Motor Co. announced its 1953 F100 series of light trucks would be available with automatic transmissions at extra cost. The units will be water cooled.

There's LESS TIME OUT

WITH CONTINENTAL RED SEAL POWER

....Because
Every Red Seal is
ENGINEERED
TO ITS WORK



PARTS AND SERVICE EVERYWHERE

Continental Motors Corporation
MUSKEGON, MICHIGAN



The Sperry Hydraulic Control, a self-contained system, consists essentially of a hand-actuated transmitter and a receiver connected by a single tube. There is absolutely no dependency on outside sources of power such as electricity or air, which are subject to failures. The system is filled with hydraulic oil, and due to the oil's incompressibility, force applied to the transmitter handle is immediately duplicated by the receiver lever. The Sperry Hydraulic Remote Control System makes possible precision operation of a remote mechanism, free of backlash and the "sponginess" of the ordinary pneumatic control. The operator is assured of instantaneous response, extreme accuracy and "feel" of the operated mechanism even though it is often out of sight and many feet away. Simple and inexpensive installation, is appreciated by all in industry.

SPERRY HYDRAULIC CONTROLS For many applications on:

AUTOMOTIVE AND AVIATION ENGINE TEST STANDS, Gasoline Engines — Jet Engines — Diesel Engines — Throttle Controls — Mixture Controls — Spark Controls — Fuel Valves — Governors — Clutches — Brakes — Rheostats — Fire Extinguishers.

Other applications: Valves, Feed Mechanisms, Hydraulic Reverse Gears, Trippers, Releases, Adjustable Stops, Duplication of Motion, Adjusting Spring Tension or Compression.

WRITE FOR MORE INFORMATION . . .

SPERRY PRODUCTS, INC.
211 SHELTER ROCK ROAD
Danbury, Connecticut
REPRESENTATIVES IN PRINCIPAL CITIES

MEN *in the* NEWS

(*Continued from page* 25)

Hudson Motor Car Co.—**Robert C. Hunter** was appointed director of dealer business management.

Cleveland Diesel Engine Div. of General Motors Corp.—The appointment of **John W. Brophy** as works manager, and **Otto H. Eberlein** as factory manager, was announced recently.

National Automotive Fibres, Inc.—**Edward P. Bolen** was elected a vice-president.

International Nickel Co. — **R. L. Lloyd** has been appointed general manager of advertising, and **R. A. Wheeler** is assistant manager.

Fruehauf Trailer Co.—**David Lewis** is now sales manager, and assistant to the vice-president in charge of sales.

Kaiser-Frazer Corp.—**M. R. Sturdivant** was recently promoted to general superintendent of aircraft fabrication and assembly.

Pacific Airmotive Corp.—With the resignation of **B. H. Atwater** as vice-president—sales, **G. T. Keller** has been appointed sales manager, engine division; **Roy Backman**, sales manager, products department; and **Ernest L. Black**, sales manager, manufacturing division.

Weber Aircraft Corp.—**James E. Gannon** was named field engineer in the product development department.

Douglas Aircraft Co.—**Frederick E. Hines** has been named a vice-president.

AiResearch Mfg. Co.—**John Muchmore** recently joined the company as staff assistant to the director of public and industrial relations.

B. F. Goodrich Co. — **Rollin D. Hager** has been appointed general manager of industrial products manufacturing.

Standard Paint and Varnish Co., Ltd.—**Robert C. Aikin** is now general sales manager.

Purolator Products, Inc.—**Robert T. Karr** was recently named assistant to the vice-president in charge of sales.

(*Turn to page* 200, *please*)


it's a matter of
PRECISION!
The lift, the power, the drive . . . yes, the air-borne heart . . .
of the YH-21 Piasecki "WORK-HORSE" Helicopter are delivered by the
three transmissions shown here . . . the forward, mid and aft.
For *this* kind of component fabrication, the best single manufac-
turing asset is the PRECISION for which *Steel Products* is famous!
"Precision in Aviation Since 1914"
THE STEEL PRODUCTS ENGINEERING CO.
engineers and manufacturers • Springfield, Ohio

made by
to insure
MASTER
SERVICE PARTS



WATER PUMPS
Lifetime-lubricated bearings. Patented long-life seals. Vacuum-tested.

CLUTCH RELEASE BEARINGS
Finest materials and workmanship assure less friction, longer wear.



TIE ROD ENDS
Four ways better! Rolled Threads, Phosphor Bronze Seat, Patented Ball Bearing Construction, Neoprene Washer and Dust Shield.

OTHER MASTER BRAND QUALITY PRODUCTS
Front End Suspension Parts • King Bolt Sets • Front Wheel Bearings
Hydraulic Brake Parts • Hydraulic Brake Hose • Stop Lite Switches
Fuel Pumps Parts and Distributors

WRITE FOR CATALOGS!
CHEFFORD MASTER
MANUFACTURING
COMPANY, INC.
Fairfield, Illinois

MEN *in the* NEWS

(*Continued from page* 198)

Euclid Road Machinery Co. — Appointed to the new position of manager, product development and engineering was **H. L. Rittenhouse. Carl Koenig** was promoted to chief development engineer, and **Louis Held** was named chief product engineer.

American Brake Shoe Co., Brakeblok Div.—**Ralph G. Robison** is now assistant sales manager of the replacement division.

Rodney Mfg. Corp. — **Charles W. Smith** was appointed general manager recently.

Four Wheel Drive Co.—**Thomas J. Totten** has joined the staff of the advertising and sales promotion department.

Chromalloy Corp.—**Richard P. Seelig** has joined the firm as executive vice-president.

F. L. Jacobs Co.—The election of **Neil A. Moore** as president and a director was announced recently.

Norton Co.—**George A. Park** has been appointed manager of distributor sales.

Westinghouse Electric Corp., Aviation Gas Turbine Div.—**James A. Wallace** is manager of the new industrial relations department.

Piasecki Helicopter Corp. — **Neal Stetson** was named director of management controls.

Price Battery Corp.—**Harry Noznesky** is now vice-president and sales manager of the company.

Gabriel Co. — **Dr. John Ruze** has been appointed director of research.

Canadian Pratt & Whitney Aircraft, Ltd., has opened its new plant outside Montreal, P. Q., and is producing P&WA R-1340 Wasp engines to power Harvard trainers now in production at Canadian Car & Foundry, Ltd.

Bell Aircraft Corp. activated its newly-acquired plant in the center of Niagara Falls, N. Y., with the transfer to it of a guided missile production department.

ACCO products CHECK

☐ Shaped Wire*
— Flat
● Round
Odd contour
Low or high carbon, stainless, special alloy, Armco. You draw the shape — PAGE can draw the wire.

☐ Armature Banding Wire
Tinned stainless or carbon steel. In reels of 50 to 200 pounds. Stainless has high tensile strength, high resistance, low permeability.

☐ Lock Safety Wire
Tough, durable, workable. In the size and type for your work.

☐ Spring Wire
Any shape* . . . high carbon . . . hard drawn . . . high tensile . . . stainless . . . galvanized . . . tinned . . . bright.

*Cross-sectional areas up to .250" square; widths to ⅜"; width-to-thickness ratio not exceeding 6 to 1.

YOU do this—
Give us the specifications of the wire you need—or tell us details of job to be done.

WE'LL do this—
Send you recommendations, prices and delivery date. Samples on request. PAGE offers you a wide variety of wires to choose from.

Wire or Write Today
PAGE WIRE
ACCO
PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE
Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.



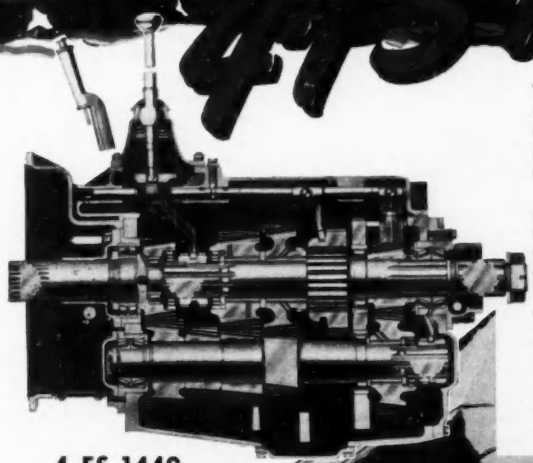
Now—Get the Advantages of Torque Converters on Your Biggest Trucks—with

Fuller 4-FS-1440

In keeping with its tradition of setting the pace with "The Best for the Biggest," Fuller announces its new 4-FS-1440 Transmission with closely spaced ratios for use with truck-type torque converters. This new unit makes new load-and-road performance possible in heavy duty service.

Built to deliver the power from the biggest automotive diesel engines now available plus ample capacity for high torque multiplication from the most advanced torque converters, the new 4-FS-1440 puts up to 400 hp. to work efficiently and dependably.

For maximum service plus maximum versatility in the toughest of heavy hauling, investigate the new 4-FS-1440. Write for performance and application data.



4-FS-1440

VITAL STATISTICS

Hp. handled—400. Speeds forward, 4: first, 1.98; second, 1.40; third, 1.00; fourth, .71. Reverse, 1.61. Weight 775 pounds.



FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.



... out of this came Aviation

... an industry with vision

An industry that by its own imaginative design created the need for manufacturing with the same intensity of imagination and vision. Indiana Gear is such a manufacturer—a company of craftsmen dedicated to producing the finest in precision parts to back up the design intelligence of this great technologically-minded country.



This 450 H.P. main gear box of approximately 12 to 1 reduction for the Sikorsky S-51 Helicopter was fabricated in its entirety by I.G.W.'s skilled craftsmen.

INDIANA GEAR

INDIANA GEAR WORKS, INC. • INDIANAPOLIS 7, INDIANA

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 98)

pass through until they are fully open. When flow is interrupted, the valves quickly reset and are ready for the next operation. *The Denison Engineering Co.*

Circle P-9 on page 65 for more data

Testing Equipment for 12-v Systems

Now in production is a complete line of testing equipment to handle 12-v service. The new equipment has increased voltmeter scale ranges, added capacities of carbon piles, different values of resistors, different power supplies and test circuits, and new units required to test the 12-v system.



Accompanying the equipment is a manual showing test procedures and many specifications applicable to the system. Any of three complete plans for the conversion of existing six-v Sun Master motor testers and accessories to six and 12-v testing are available. *Sun Electric Corp.*

Circle P-10 on page 65 for more data

Slim Direction Signals

Direction signals are now being offered which feature Stimsonite lucite lenses.

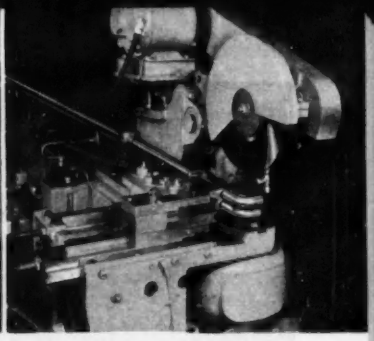
(*Turn to page* 205, *please*)



HEAVY, TAPERED HOLLOW SECTION — Pieces fabricated from 2 tapered welded strips of 12 gauge steel stock are given a 34" radius bend and a 41° edge bend on a Pines Size 4 Bender.



STEEL RODS — Multiple groove die on Pines Size 3 Automatic Bender forms ten 7/16" x 67-1/4" steel rods simultaneously to a 22" radius for farm implements.



COPPER ELLS — 3/4" ells are formed to 7/8" c/l radius and cut off automatically two at a time from 20 ft. stock lengths on a Pines Size 3/4 Bender.

For NEW IDEAS in METAL FORMING



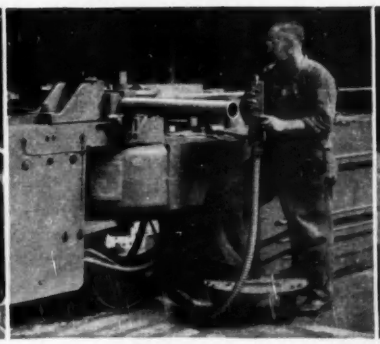
SQUARE TUBING—An eight foot length of SAE 4130 steel tubing 3" square, 1/4" wall, is compound bent to close tolerances. Segment mandrel maintains smoothness of the 10" inside radius bend.

investigate PRODUCTION BENDING the "PINES-WAY"

When you have a production problem of cold forming parts from round, square, rectangular, extruded or hollow stock to an even radius, or to different angles, chances are you will find the job can be handled more profitably on a Pines Automatic Bender. The examples shown here are only a few of the many different applications, in addition to ordinary tube bending, that are today handled efficiently on Pines machines. Production-wise and cost-wise, you will find bending the "Pines-Way" is a more accurate and profitable metal forming process. Investigate production bending today. Call on Pines engineers for assistance without obligation.



SQUARE STEEL BARS — Compound bends at each end and large center-radius helix are cold formed on a Pines Size 2 machine. Tooling costs reduced 75%, half of the production operations eliminated.



4" I.P.S. EXTRA HEAVY PIPE — Cold forming in place of hot bending on this Size 4 Pines bender eliminated a costly pickling operation at Allis-Chalmers' West Allis plant.



EXTRUDED ALUMINUM — Part of a production line set-up in a large aluminum fabricating plant, this small Pines Semi-Automatic bends an intricate extruded moulding for automobile window frames.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

653 WALNUT • AURORA, ILLINOIS

WRITE FOR *Free* DATA SHEETS

To keep abreast with bending, ask to be placed on the mailing list for "Pines News", bi-monthly mailing piece that gives facts and figures on new unusual production applications.



BENDING • DEBURRING • CHAMFERING • THREADING MACHINERY

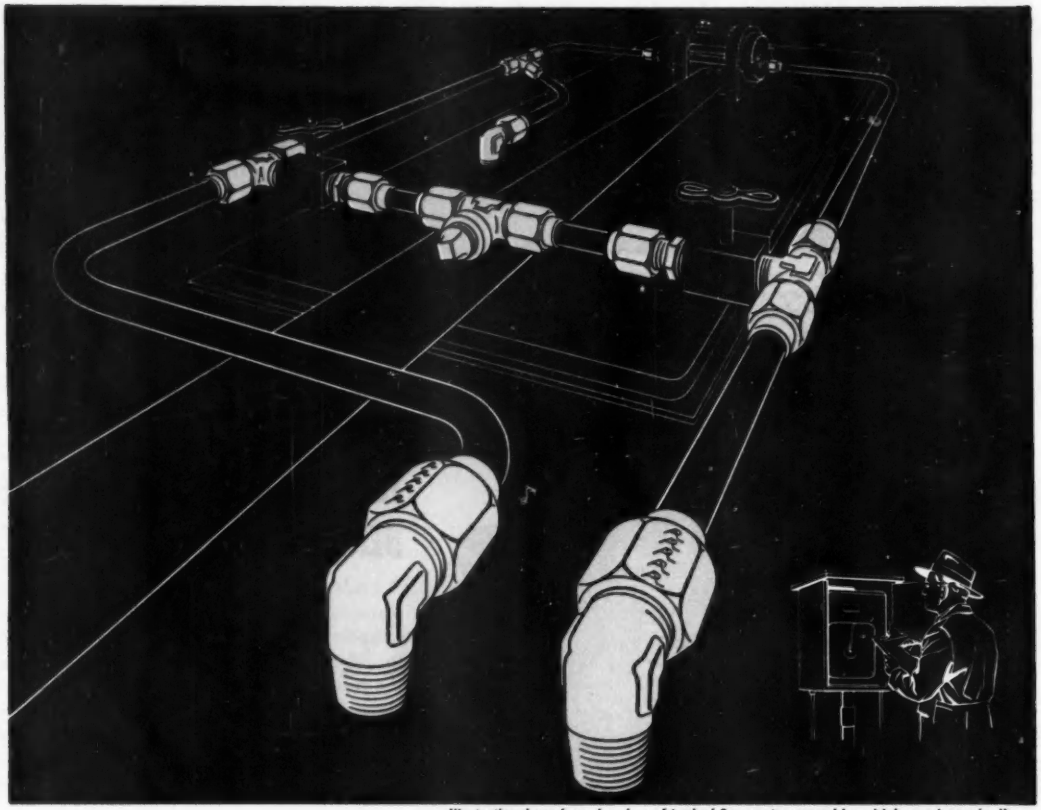


Illustration based on drawing of typical flow-meter assembly, widely used on pipelines.

Tube it up...Forget it!

WITH PARKER TRIPLE-LOK FITTINGS

This does it



Triple-lok . . . 3-piece flare fitting famous for its sleeve . . . the easiest way to install tubing systems. Made in brass, steel, stainless steel, aluminum alloy.

Precision Mark of

Leakproof Tube Fittings

On a pipeline, for example, where many of the flow meters are located in isolated spots. Not even the smallest leak can be tolerated, because delicate instruments must register with accuracy at all times. Yet fittings must permit repeated reassembly so that meter stations can be serviced easily and quickly. And fittings must permit tube bends close to connections to conserve space.

PARKER Triple-lok Fittings — as specified by the A.S.M.E. Code for Pressure Piping and by J.I.C. and S.A.E. standards — are designed and precision made to be leakproof even under conditions of severe vibration, elevated temperatures, high pressures and repeated reassembly. That's why more and more manufacturers are specifying Triple-lok.

So *tube it up and forget it* . . . with Triple-lok Fittings. Ask your PARKER Distributor for Tube Fitting Catalog 4300, or write The PARKER Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio.

Parker

TUBE FITTINGS • VALVES • O-RINGS

Plants in Cleveland • Los Angeles • Eaton, Ohio • Berea, Ky.

Parker

INDUSTRIAL TUBE FITTING STOCKS CARRIED BY

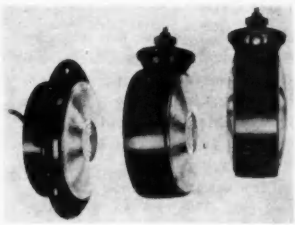
AKRON, O.	B. W. Rogers Co. 850 So. High St. (9)
BALTIMORE, Md.	Carey Machinery & Supply Co. 3501 Brehms Lane (13) Whitehead Metal Products Co. 4300 E. Monument St. (5)
BEAUMONT, Tex.	Standard Brass & Mfg. Co. 705 Milam St.
BOSTON, Mass.	A. E. Borden Co., Inc. 176 Brookline Ave. (15)
BRYSON CITY, N. C.	Wallace Co. of Carolina P.O. Box 572
BUFFALO, N. Y.	Whitehead Metal Products Co. 2128 Elmwood Ave. (17)
CAMBRIDGE, Mass.	Whitehead Metal Products Co. 281 Albany St. (39)
CEDAR RAPIDS, Ia.	Globe Machinery & Supply Co. 309 8th Ave., S.E.
CHICAGO, Ill.	Wallace Tube Co. 1300 Diversey Parkway (14)
CINCINNATI, O.	Williams & Co. 3231 Fredonia Ave. (29)
CLEVELAND, O.	W. M. Pattison Supply Co. 777 Rockwell Ave. (14) B. W. Rogers Co. 1900 Euclid Ave. (15) Williams & Co. 3700 Perkins Ave. (14)
COLUMBUS, O.	Williams & Co. 851 Williams Ave. (8)
DALLAS, Tex.	Metal Goods Corp. 6211 Cedar Springs Rd. (9)
DAVENPORT, Ia.	Globe Machinery & Supply Co. 410 East Second St.
DAYTON, O.	J. N. Fauver Co. 1534 Keystone Ave. (10)
DENVER, Colo.	Metal Goods Corp. 2425 Walnut St. (2)
DES MOINES, Ia.	Globe Machinery & Supply Co. East First & Court Ave. (6)
DETROIT, Mich.	J. N. Fauver Co. 49 West Hancock St. (1)
HARRISON, N. J.	Whitehead Metal Products Co. 1000 South Fourth Ave.
HOUSTON, Tex.	Metal Goods Corp. 711 Milby St. (3) Standard Brass & Mfg. Co. 2018 Franklin St. (1)
INDIANAPOLIS, Ind.	Korhumel Steel & Aluminum Co. 1916 N. Meridian St. (2)
KANSAS CITY, Mo.	Metal Goods Corp. 1300 Burlington Ave. North Kansas City (16)
KNOXVILLE, Tenn.	Leinart Engineering Co. 412 E. 5th Ave. (5)
LOS ANGELES, Cal.	Haskel Engineering & Sup. Co. 721 W. Broadway, Glendale (4) Metropolitan Supply Co. 353 East 2nd St. (12)
MEMPHIS, Tenn.	J. E. Dilworth Co. 730 South Third St.
MILWAUKEE, Wis.	Marman Belting & Supply Co. 522 W. State St. (3) Wallace Co. of Wisconsin 838 Sar 6th St. (4)
MINNEAPOLIS, Minn.	Vincent Brass & Copper Co. 124 Twelfth Ave., So. (15)
NEW ORLEANS, La.	Metal Goods Corp. 432 Julia St. (13)
NEWPORT NEWS, Va.	Noland Company 27th St. & Virginia Ave.
NEW YORK, N. Y.	Whitehead Metal Products Co. 303 West 10th St. (14)
PHILADELPHIA, Pa.	Louis H. Hein Co. 15 West Lancaster Ave. Ardmore, Pa. Whitehead Metal Products Co. 1955 Hunting Park Ave. (40)
PITTSBURGH, Pa.	Williams & Co. 901 Pennsylvania Ave. (33)
PORTLAND, Ore.	Hydraulic Power Equipment Co. 2316 N. W. Savier St. (10)
ROANOKE, Va.	Noland Company 11 Salem Ave. (10)
ROCKFORD, Ill.	Rockford Tool & Transmission Co. 802 Broadway
SAN FRANCISCO, Cal.	General Machinery & Sup. Co. 1346 Folsom St. (3)
SEATTLE, Wash.	Palmer Supply Co. 222 Westlake Ave., North (9)
ST. LOUIS, Mo.	Metal Goods Corp. 5239 Brown Ave. (15)
SYRACUSE, N. Y.	Whitehead Metal Products Co. 207 West Taylor St. (14)
TOLEDO, O.	Williams & Co. 650 E. Woodruff Ave. (2)
TULSA, Okla.	Ardun Supply Co. 317 S. Detroit Metal Goods Corp. 302 North Boston (3)
CANADA	Railway & Power Engineering Corp. Ltd.
EXPORT	Mercator Corp. 438 Walnut St. Reading, Pa.

NEW PRODUCTS

For additional information please use postage-free reply card on page 65

(*Continued from page* 202)

A slender 2⅛ in. deep, the signals are round based with single hollow stud mountings to reduce vibration. Single screw is removed to service lens or bulb.



Switches are said to be burn-out proof of either self-cancelling or non-cancelling type. Signals may be had for six or 12-v systems, with single or double face light units. *R. E. Dietz Co.*

Circle P-11 on page 65 for more data

Automobile Body Soldering Set

Now available is an improved soldering and heating outfit for automobile body and fender repair work. All necessary apparatus for soldering, heating, and light brazing on cars and trucks is said to be included in this Presto-O-Lite outfit.



Heating elements include four open-flame torch stems and a pointed copper soldering iron. Head sizes vary from one for light soldering, such as is needed for soldering wire connections, to a heavy stem used for loosening rusted nuts and bolts and suitable for heating and straightening bent automobile frames. The soldering iron handles any light work in locations where an open flame is not practical.

All heating stems attach to a precision handle equipped with a pilot flame control unit built into the shut-off valve. This unit reduces the flame to pilot light size and saves fuel whenever work is stopped temporarily.

A "Y" connection for a standard acetylene cylinder regulator is also supplied with this outfit. This connection permits the air-acetylene soldering torch to be connected to an acetylene cylinder at the same time as standard cutting and welding equipment. This simplifies repair work by eliminating the time needed to disconnect the acetylene hose from cutting or welding blowpipe and connect it to the torch. Soldering can be done immediately following cutting or welding.

Hose and hose fittings complete the outfit. *Linde Air Products Co.*

Circle P-12 on page 65 for more data

Car Washing Brush

Recently marketed is a brush for washing automobiles with a needle type valve which screws on to any standard hose. This valve, operated by a push button, is said to provide instant control of the water flow to the brush through a flexible tube.



Since water pressure is eliminated at the valve, the tube may be moved in any direction at any speed without splash. According to the maker, brush

(*Turn to page* 206, *please*)

If you have an
AUTOMOTIVE
PROBLEM
in production,
assembly, packaging,
shipping



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and money with
the proper use of
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New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 205)

bristles will not scratch car finishes and will work easily into corners and moulding grooves. *Free Action Fountain Brush Mfg. Co.*

Circle P-13 on page 65 for more data

Plastic Windshield Protector

Designed to eliminate the nuisance and safety hazard of windshields becoming ice-covered while parked during sleet, rain, and snow season, a plastic windshield protector has a sewn-on cloth edge. It can be kept in a car's glove compartment and is put on in a few seconds with nothing to tie or adjust. The car doors hold it firmly in place.



The protector is made of polyethylene, which is claimed to withstand temperatures as low as —60 F without becoming brittle. *Central States Paper & Bag Co.*

Circle P-14 on page 65 for more data

Interlocking Wiring Device

Recently marketed is an interlocking wiring device designed to prevent accidental disconnects in automobile repair shops and service stations. Power supply to portable electric equipment is kept constant, thus cutting waste of production time, according to the manufacturer.

Known as Hart-Lock, it is plugged in like an ordinary connecting device. A simple twist locks it securely against unintentional disconnects due to tripping, pulling, and vibration. A reverse twist unlocks it.

(*Turn to page* 208, *please*)

BROKEN TAPS
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TOOL & DIE
Repairs!

REPORTED:
$70,000.00 in savings every year in Tool and Die Repair alone from only two Thomas Metalmasters in the world's largest cash register manufacturing plant.

REPORTED:
Terrific drop in scrap loss per man from $35.00 per man to $8.00 per man with the use of 14 Thomas Metalmasters in the world's largest Aircraft engine manufacturing plant.

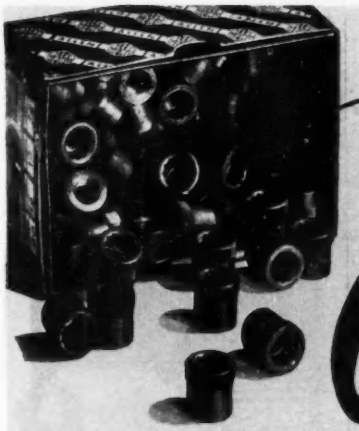
With the Thomas Metalmaster Disintegrator you'll actually remove broken tap cores in minutes with no fuss—no bother—no toil . . . PLUS the fact that you'll not injure or effect the temper of the workpiece.

For technical information relative to metal disintegration via the TM way send for your copy of the Thomas Metalmaster Technical Bulletin published monthly in the interest of metal disintegration advancement. This is the only complete and reliable source on metal disintegration available in the world. Direct reports monthly of our findings and advancements right from our own complete Research Laboratories.

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9 design problems that can be met with the... Allenut

Ever-increasing applications for the new ALLENUT have caused sales to double within the past two years. Here are some of the things it can do to aid your product designing:



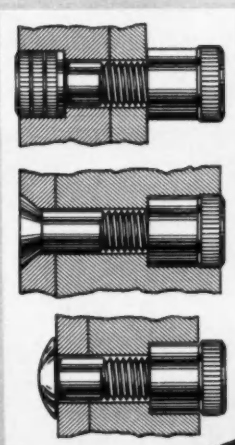
1. Self-anchoring in any metal. Allenut provides positive anchoring action through its hardened knurls.

2. Compact design. Requires no space for box wrenching. 12-point socket permits tightening in awkward places.

3. Smooth surfaces. Fits flush or below surface in counterbored hole . . . permits streamlined, safe surfaces.

4. A ready-made, hardened, tapped hole. When used as a bushing, prevents costly stripping of threads caused by frequent removal and replacement of screw or bolt. In castings and other soft metals a stripped hole can be counterbored, an Allenut inserted and the same bolt or screw used.

5. Tighter fit. Greater thread contact than with ordinary nuts because of Class 3 fit. Weld-like setups accomplished with one hand wrenching. Allenut holds firm against turn of screw.



6. Usable with any type of bolt or screw. Permits space-saving, internal wrenching of cap screws, T bolts, machine bolts, and other common fasteners.

7. Saves parts. No washers required when anchored.

8. Easier to use. Knurled ring facilitates fingering-in. Allenut is always square to counterbored hole. Removable by hitting screw or bolt head with tap of a hammer.

9. Reusable indefinitely. Anchoring action remains unimpaired. Hardened threads and socket stand up under repeated removal and replacement.



Allenuts are available in a full range of 14 standard sizes from no. 4 to 1" from leading industrial distributors.



We welcome your inquiry and request for engineering details on Allenut applications.



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Put more power into manpower with this speedy portable impact tool that handles any tightening or removing operation. Runs nuts and bolts up to ½-inch in size. Quickly converts for drilling, reaming, tapping, extracting broken capscrews or studs. Drives wood augers, wire brushes, sanders, etc. Ideal for close quarter work. Send for Descriptive Bulletin No. 2422.



Portable Electric Screwdriver

Slashes assembly costs — speeds shop operations. Weighs only 3½ lbs. Equipped with 2 finder-type bits and Allen hex wrench. Model 143S.

Mall TOOL COMPANY

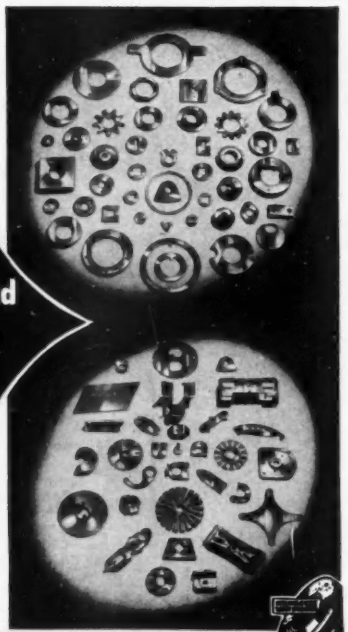
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New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 206)



Improved contacts, it is stated, provide greater electrical efficiency, minimum resistance, and low loss. Flush units are optionally back-wired for faster, easier installation.

The manufacturer states that Hart-Lock provides safe, positive connection for drills, grinders, drivers, spot welders, battery chargers, extension lights, testing equipment, disc sanders, buffers, and vacuum cleaners. Grounding types are provided, as well as accommodations for polarized and non-polarized caps.

A complete line is available in two, three, and four-wire caps, connectors, plug bases, motor plugs and flush receptacles—20 amp, 250 v, or 10 amp, 575 v. *Arrow-Hart & Hegeman Electric Co.*

Circle P-15 on page 65 for more data

Off-the-Road Tire

Now available is an off-the-road high flotation tire that reportedly provides positive traction in sand or loamy soil. The tire is the 65-in., 18-ply rating all-nylon wide base Earth-Mover.

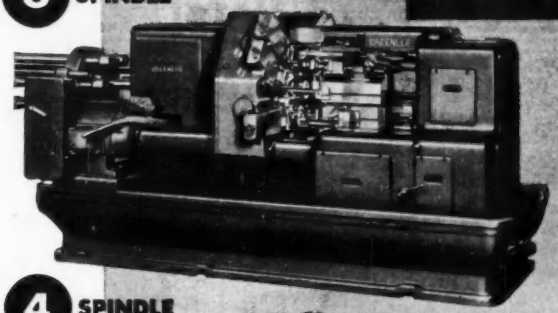
Rounded to produce better flotation, the tire operates at air pressures of 20 to 25 lb in sand. Tapered bead seats prevent slippage on rim at low pressures. *B. F. Goodrich Co.*

Circle P-16 on page 65 for more data

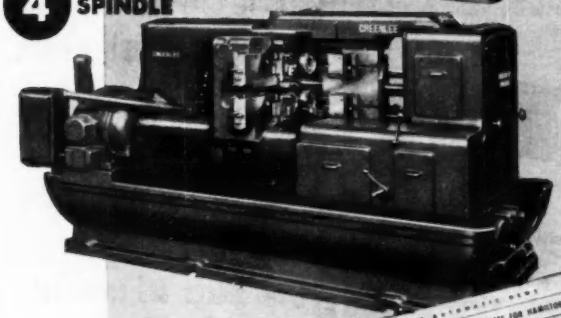
(*Turn to page* 210, *please*)

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6 SPINDLE



4 SPINDLE



Maximum economy of operation on long-run jobs, with an uncluttered, easily-reached tooling area that allows rapid and accurate positioning of tools and attachments . . . permitting precise inspection of work finish and tolerances *on the machine.* The Greenlee "Six" is available in 1″, 1-5/8″, and 2″ capacity — the "Four" in 1-5/8″ and 2-5/8″ capacity.

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Automatic News

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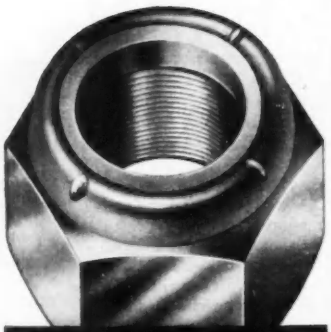


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Bolt threads are gripped tightly . . . these famous nuts *never* work loose. Yet an ordinary hand wrench gives instant release. The tough, built-in GREERCOID collar does it . . . and seals against fluid leakage, too!

Study *your* fastener problem. Over 3000 types and sizes. Consult GREER. Proved on thousands of products. Meets gov't and military specifications.

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GREER Stop Nuts

New Products

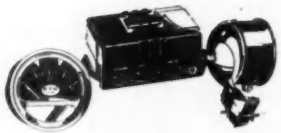
For additional information please use postage-free reply card on page 65

(*Continued from page* 208)

Electric Tachometer

Now available is an electric tachometer that is said to bring about substantial gas and oil savings.

Indirect lighting for good nighttime visibility, large numerals, and the steady action of the instrument pointer are notable features.

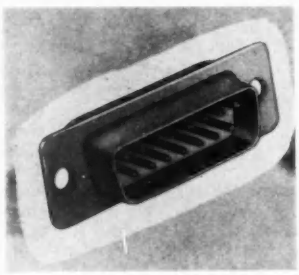


The transmitter reportedly has no drive cable to break or to cause trouble. Only moving part is said to be an electric relay switch with solid silver contacts. *Tachometer Div., Sun Electric Corp.*

Circle P-17 on page 65 for more data

Miniature Connectors

Now on the market is a series of four miniature connectors of advanced design. Designated the "D" Series, the contact complement ranges from 15 contacts to 50, with the smallest having an overall length of 1 17/32 in., depth 31/64 in., and width 27/64 in., plus a solder pot extension of 9/64 in.



To provide for this fitting, two major innovations were made in the materials: steel shell and a nylon insulator. The steel shell is said to

(*Turn to page* 212, *please*)

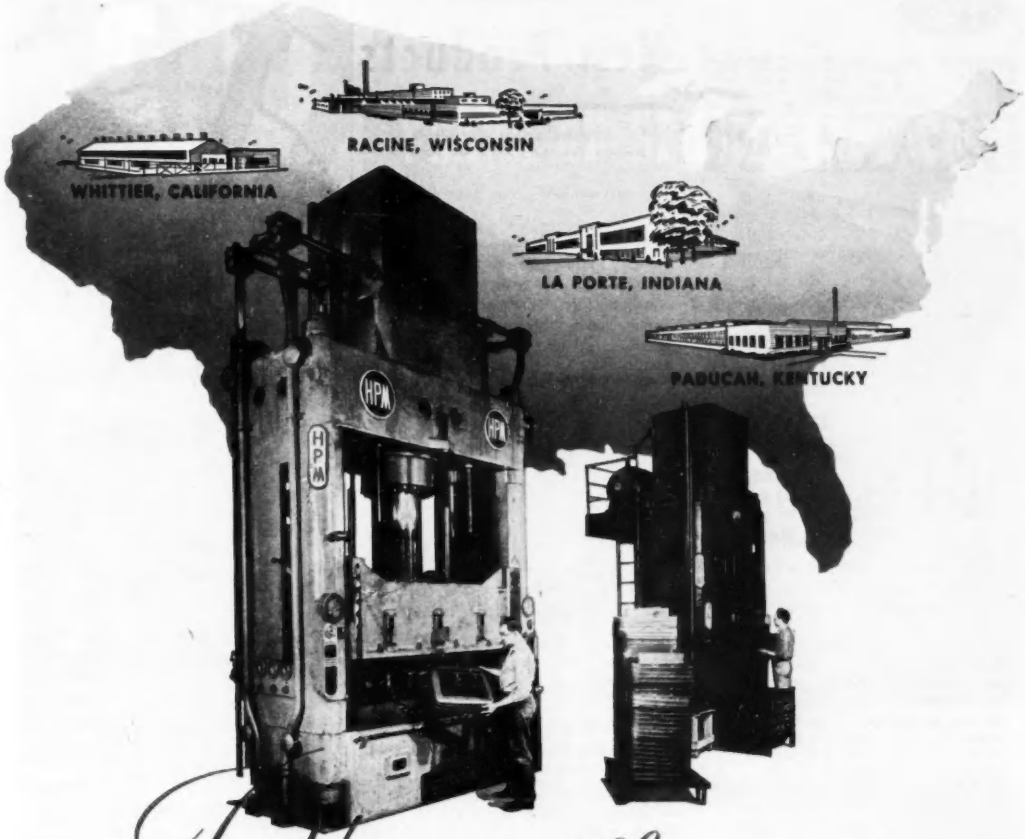
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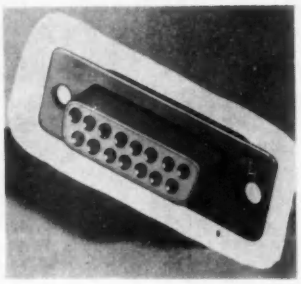
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New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 210)

provide high strength, while the insulator makes possible high dielectric qualities for the gold-plated five-amp contacts (No. 20 wire) which have a conservative minimum flashover of 1500 v a-c rms.

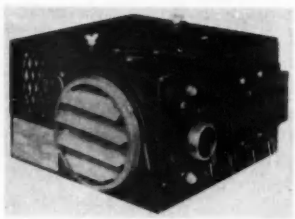


Suitable for rack and panel mounting, the "D" Series may be used as plugs on either side of the assembly by the addition of a junction shell, with an integral clamp. The major applications of the "D" include small instruments, computor circuits, small pre-amplifiers, telemetering equipment, and general instrumentation in radio and electronics. *Cannon Electric Co.*

Circle P-18 on page 65 for more data

Improved Gasoline Heater

Model UH47 gasoline heater for either Diesel or gas-powered trucks and tractor cabs has been improved by an efficient manifolding system.



It is said to permit exhausting of combustion gases at any point desired

(*Turn to page* 214, *please*)



5
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- Constant product inspection from laboratory metal analysis, through production and final finish is your assurance of precision made, trouble-free screws, bolts and nuts.



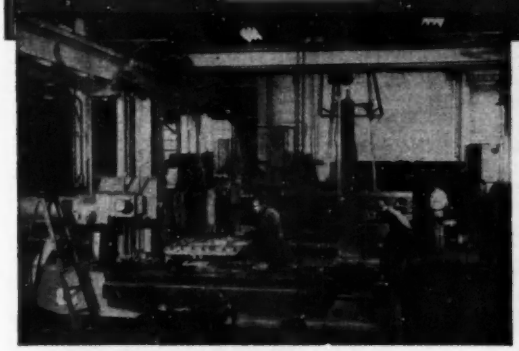
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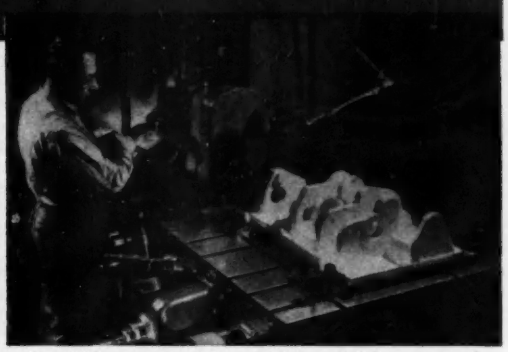


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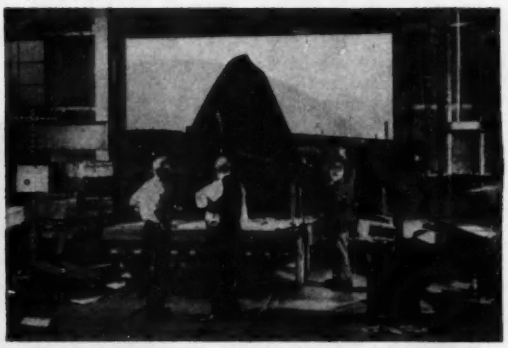
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More shipments than ever, but, of course, defense priorities dictate who gets what. Perhaps this is the machine we originally scheduled for you.



New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 212)

within a radius of 12 ft from the heater, as compared with a previous limit of 30 in. Thus, gases may be exhausted to the outside of the vehicle at either side, top, bottom, front or rear.

The heater reportedly operates entirely independent of the vehicle engine, providing full heat delivery under thermostatic control at all times. It burns any type gasoline, averaging less than one pint of fuel consumption per hour, according to the manufacturer.

Easily installed, the heater may be fueled direct from vehicle tank by electric pump or equipped with its own fuel tank for use with Diesel engines. Constant circulation of warm air at any temperature desired is maintained by an electric blower fan. Controllable heat range is from 5000 to 15,000 Btu per hour. *Hunter Manufacturing Co.*

Circle P-19 on page 65 for more data

Temperature Gage For Differentials

A differential temperature gage, designed to warn drivers of heavy-duty trucks of overheated differentials resulting from low tire pressure, wheel drag, broken springs or improper loading, has been introduced.

Normal temperatures run between 160 deg and 190 deg; however, on many tandem axle installations the maximum temperature is claimed to be 265 deg. The gage permits the driver to keep a constant check on the temperature of the oil.

The sending device of the assembly is mounted in a hole drilled and tapped in the differential housing below the filler plug. The temperature gage is mounted on the dash and connected to the sender and electrical system by wire leads. *Instrument Div., Stewart-Warner Corp.*

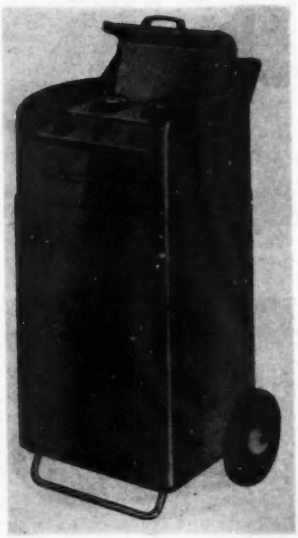
Circle P-20 on page 65 for more data

Multi-Purpose Battery Chargers

A line of eight battery chargers, under the trade name of "Dyna-Chargers," is said to contain a charger for every battery servicing purpose, including two models designed to handle both 12-v and 6-v batteries.

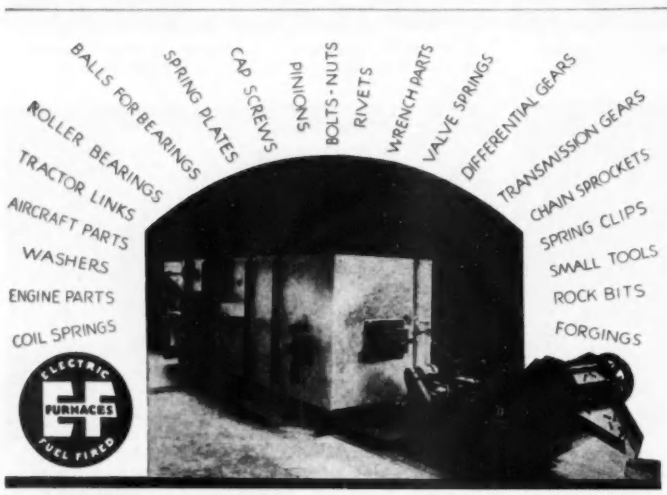
The line is comprised of: three wheel-mounted, 100-amp fast-slow chargers; three portable, 75-amp fast-slow chargers; a wall type Unitron slow charger; and a 4-amp overnight charger for home use by car, truck, and tractor owners.

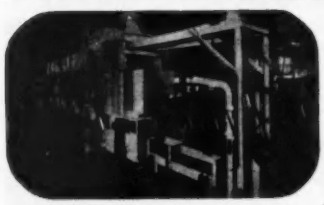
Claimed to be an exclusive method of battery testing, the "Dyna-Meter," is an integral part of De Luxe Models F-260 and F-250. This test, according to the manufacturer, measures the internal resistance of the battery and shows its true condition and its ability to take and hold a charge.



Other features of the chargers reportedly include two-tone chip-proof finish; full-wave, low-power-consumption selenium rectifiers; moisture-proof, tension-wound transformers; synchronous electric fast charge time controls with automatic switching to a slow charge or "finishing" rate at end of fast charge; thermal overload circuit breaker burnout protection; and extreme durability of cabinets and components. *Allen Electric and Equipment Co.*

Circle P-21 on page 65 for more data





EF Chain Belt Conveyor Furnace, Radiant Tube Gas Heated, Showing Labor Saving Loading Arrangement. (In the view at the top) Electrically Heated Furnace Showing Automatic Quench and Discharge.

For Hardening Small Parts

Uniformly—Scale Free—Continuously

175 to 2000 Lbs. per Hr.

The EF chain belt conveyor furnace is one of the most satisfactory continuous heating units yet devised for scale-free hardening, carbon restoration and non-decarb heat treating small and medium size parts. 11 standard sizes. Capacities to 2000 lbs. or more per hour. Gas, oil or electrically heated. Furnished complete with any desired feeding or discharging equipment. Write for folders describing our chain belt or other production furnaces.

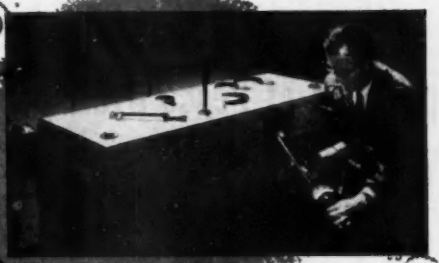
THE ELECTRIC FURNACE CO.

WILSON STREET, SALEM, OHIO

Gas Fired, Oil Fired and Electric Furnaces

Canadian Associates • CANEFCO LIMITED • Toronto 1, Canada

...FROM HELL TO THE NORTH POLE *and back again*



Checking the temperatures of an aircraft test assembly in the High Temperature Chamber at 200° F.



Aero-hydraulic swivel joint assembly being taken from the Cold Chamber where it has been subjected to 75° below zero temperature for 168 hours.

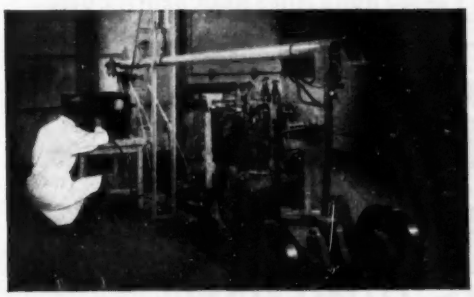


Heavy duty Rotator and Oscillator testing an aero-pneumatic swivel joint assembly used on the wing fold of a Navy dive-bomber.

CHIKSAN Hydraulic Swivel Joints tested in "Torture Chambers"

Despite the ever-increasing demands of Industry and the Armed Services, when it comes to setting rugged specifications Chiksan is its own harshest judge.

No Chiksan Hydraulic Ball Bearing Swivel Joint that can't pass the punishing tests of Chiksan "Torture Chambers" ever gets onto our loading platform, let alone actual use!



A pulse pressure generator where aircraft and ordnance hydraulic joints are subjected to shock pulses to 10,000 psi 240 times per minute.

There's an Arctic Chamber where the temperature drops to 75 degrees below zero to find out how metals, packings and working parts will react in most extreme cold. The Equatorial Box sends the thermometer soaring up to a sweltering 200 degrees to learn if Chiksan Joints can take it.

In the case of 3000 psi tests Hydraulic Joints are subjected to shock pressures from 0 to 4250 psi, 35 times a minute for 100,000 cycles. In testing special ordnance this rate has been stepped up to 240 times a minute at 0 to 10,000 psi. All test equipment has been designed and developed by Chiksan Engineers.

Every requirement of #MIL-J-5513 A is met—and in the case of Hydraulic Swivel Joints shipped for private use, standards are equally exacting.

No wonder Industry and Defense rely upon Chiksan to speed the flow of enterprise—to *keep* it flowing in a swift, reliable stream!

Representatives in Principal Cities
Write for Catalog 2A, Dept. 11-AI

The Flow of Enterprise Relies on

CHIKSAN

Ball-Bearing Swivel Joints

CHIKSAN COMPANY • BREA, CALIFORNIA • Chicago 28, Illinois • Newark 2, New Jersey

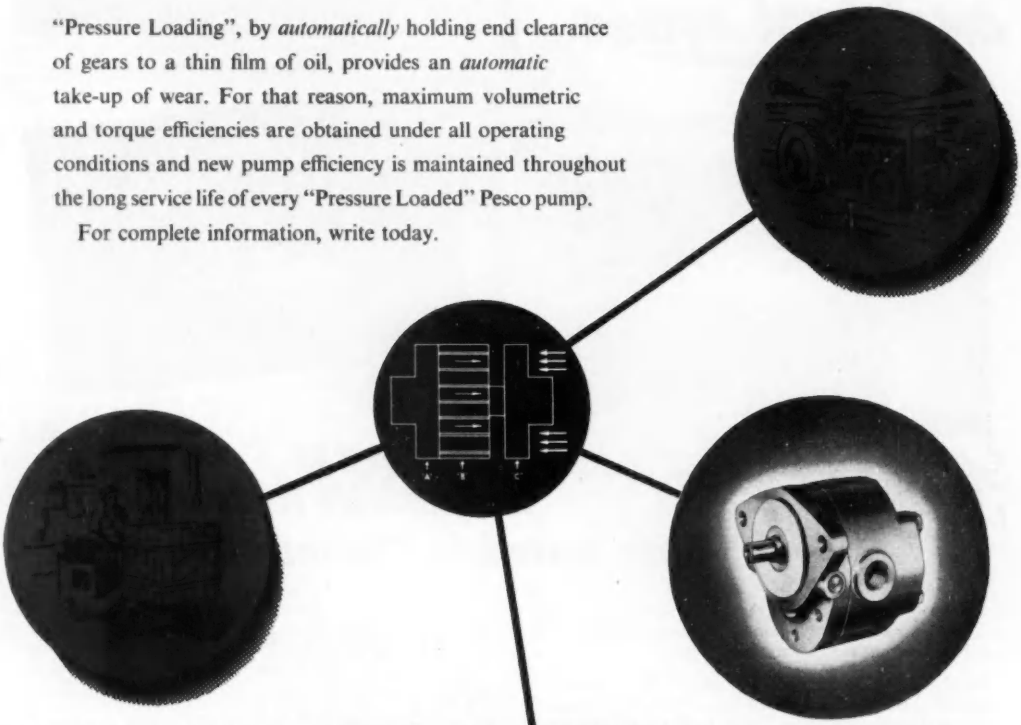
Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Chiksan Export Company (Subsidiary), Brea, California • Newark 2, N. J.

"PRESSURE LOADING" is the exclusive, patented principle of Pesco Hydraulic Pumps which results in:

Volumetric efficiencies up to 97%...Torque efficiencies up to 90%

"Pressure Loading", by *automatically* holding end clearance of gears to a thin film of oil, provides an *automatic* take-up of wear. For that reason, maximum volumetric and torque efficiencies are obtained under all operating conditions and new pump efficiency is maintained throughout the long service life of every "Pressure Loaded" Pesco pump.

For complete information, write today.



Pesco Products Division, Borg-Warner Corporation | 24700 North Miles Road, Bedford, Ohio

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More power to you!

In the vital electrical equipment industry, as in practically all other fields, the uses for OSTUCO Tubing are countless. Transformer and header tubes, columns, bushings, bearings, housings, and mounts are only a few of the specific applications in generators, motors, starters, power equipment, and many other electrical products that mean power to you.

Whether your products are electrical or of an entirely different type, you'll be wise to investigate the advantages of OSTUCO Tubing, in improving design, increasing strength, reducing weight, and cutting cost. We cannot always promise early delivery estimates on new civilian orders, because of military demands, but it will pay you to consult our experienced engineers about OSTUCO Tubing when redesigning your products to meet future competition.



THE OHIO SEAMLESS TUBE COMPANY

Manufacturers and Fabricators of Seamless and Electric Welded Steel Tubing

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SPOKE WHEELS

. . . Standard on FORD F-7 and F-8 "Heavies"

In building "Big Job" trucks that give long, dependable hauling service, Ford engineers specify spoke wheels as standard equipment. These sturdy lightweight wheels are made to stand the gaff of full pay-load operation. One reason . . . they're constructed of rugged cast steel. Another . . . the spoke design provides better ventilation . . . carries off more of the heat that arises from hard-working brake drums.

• Spoke wheels reduce "down time" . . . provide faster tire changes on tight schedules . . . assure minimum unsprung weight . . . and cut per mile operating costs. Be sure your new Ford F-7 or F-8 is equipped with spoke wheels. They're standard at no premium in price.

The spoke wheels used by Ford are made by Gunite Foundries Corporation . . . a leader in the development of superior metals and metal products since 1854.



GUNITE REAR TRUCK WHEEL

GUNITE

GUNITE FOUNDRIES CORPORATION, Rockford, Illinois

What Do You Want Most in Tube Fittings?

NO LEAKS

ability to withstand VIBRATION

FASTER assembly

Get Them ALL in IMPERIAL *Hi-Duty*® FITTINGS



The Tube Coupling that will not leak even under vibration

Imperial Hi-Duty Fittings withstand over 5 times as much vibration as ordinary Compression or Flared brass fittings. Design of sleeve minimizes deformation of tubing in assembly—tubing is kept stronger at points of greatest stress. Trouble-proof performance proved by widespread use in severe applications.



SLEEVE SHEARS OFF AT GROOVE



- ★ **For Tubing ⅛" to ¾" O.D.**
- ★ **Available in Brass or Aluminum**
- ★ **Ask for Bulletin No. 3002**

Easier and Quicker to Assemble

Fitting comes with nut assembled. To get a tight joint, simply insert tube into fitting and tighten nut. No loose sleeve to drop . . . no flaring required. Makes repeated tight reconnections.



With IMPERIAL you can be sure of the finest in fittings . . . fittings that have *forged* bodies on elbows and tees providing greater strength and toughness . . . *long* Dryseal pipe threads for extra assurance of tight pipe connections. See Catalog 350.

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IMPERIAL

Pioneers in Tube Fittings and Tube Working Tools

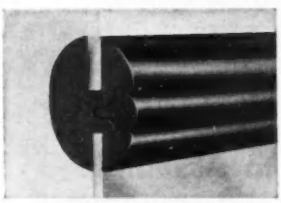


You meet a lot of water in *driving* too!

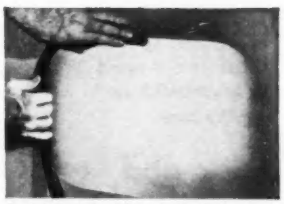
Sometimes, in a heavy rainstorm, you feel like the skipper of a cockleshell in a hurricane. And you *are* meeting a lot of water . . . taking it head-on, slashing at terrific speed against your windshield. You'll develop leaks, all right, with ordinary cement-and-binder sealing methods. But NOT with Inland Self-Sealing Weather Strip. Unique design, using the natural resilience of rubber, *permanently* compressed, gives *permanent* weather sealing!

It costs *less* to build vehicles with Inland Strip . . . because installation is a fast, one-man job. And vehicle *users* save on glass replacement, for the same reason. For that double economy, design your vehicles to take Inland Self-Sealing Weather Strip.

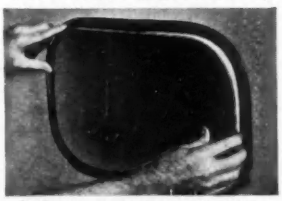
INLAND MANUFACTURING DIVISION
General Motors Corporation • Dayton, Ohio



1. Cross-section of Inland Weather Strip.



2. Set the Inland Strip in the body panel.



3. Slip the glass into the Inland Strip.



4. Zip the filler strip into the channel.

INLAND MANUFACTURING

Self-Sealing Weather Strip

(PATENTED)

Proved and approved
for over 13 years

SAGINAW *Hydraulic* POWER STEERING

*Now available on 1952 model Oldsmobiles, Buicks and Cadillacs

Since 1939, when it was introduced, Saginaw hydraulic power steering has proved its worth over and over again on thousands of commercial vehicles.

Now Saginaw hydraulic power steering is available on passenger cars! And already it has won wide acceptance, for "there is no steering like power steering . . . and no power steering like Saginaw *hydraulic* power steering."

This new application of the Saginaw hydraulic power steering principle is amazingly simple in design . . . has fewer moving parts, fewer parts in all. It retains the natural feel of ordinary steering at moderate speeds, but makes a spectacular reduction in steering effort at low speeds or for parking.

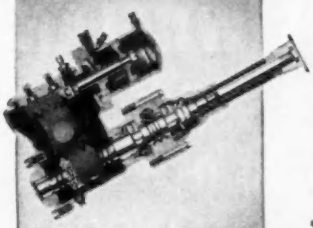
For further information, write Saginaw Steering Gear Division of General Motors.

IF IT'S EASY TO STEER . . . IT'S A SAGINAW GEAR



RECIRCULATING BALL PRINCIPLE

Saginaw's famous recirculating ball principle provides friction-free operation that is unique in the industry. It is a principle proved in over a million automotive steering gears.



HYDRAULIC POWER STEERING

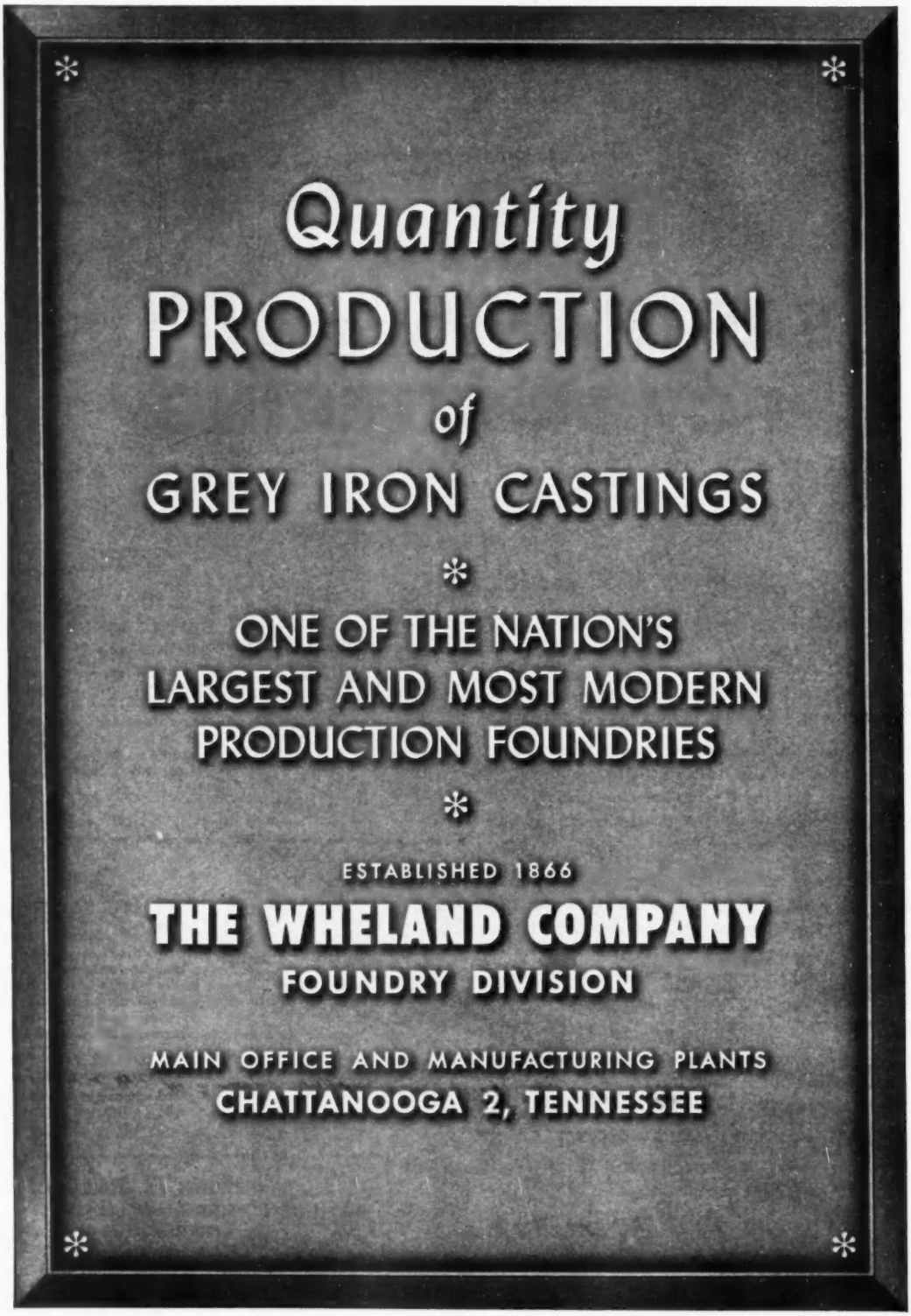
A hydraulic booster multiplies driver steering effort, makes it easy to swing the wheel of the biggest car traveling at any speed—or even when standing still.

*Optional equipment at extra cost

Saginaw
STEERING GEAR DIVISION
General Motors Corporation, Saginaw, Michigan

SSG PRODUCTS

STEERING GEAR ASSEMBLIES • STEERING LINKAGE ASSEMBLIES • PROPELLER SHAFTS • DIESEL ENGINE AND AIRCRAFT PARTS


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PRODUCTION
of
GREY IRON CASTINGS
ONE OF THE NATION'S
LARGEST AND MOST MODERN
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MAIN OFFICE AND MANUFACTURING PLANTS
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Helicopter transmission gear assembly offers challenging array of oil sealing problems

Good mechanical design and careful engineering have effectively solved a complex oil sealing problem in the main power transmission assembly of the Hiller Helicopter. This assembly uses planetary gears in a light-weight magnesium housing and requires lubricant sealing at several points.

At the top of the gear housing (Figure 1) it is necessary to seal the vertical drive shaft against entry of dust, moisture, etc. It is also necessary to contain S.A.E. #40 oil introduced near the sealing point, rate-of-flow 4 to 5 pints per minute. A National 10,000-S Syntech* seal is used. This seal has a felt outer member to exclude foreign matter and a spring-loaded synthetic rubber inner member to retain the oil.

As the oil circulates down through bearings and bevel gears, it is necessary to seal the small horizontal tachometer drive shaft, the horizontal tail rotor drive pinion and a vertical fan drive pinion shaft. Here the problem is primarily retaining the lubricant, and conventional National 50,000-S Syntech seals provide effective sealing.

The most demanding oil seal problem is sealing the vertical sun gear drive shaft where it enters the bottom of the gear housing. The shaft revolves at 3,000 r.p.m., and the carrier set revolves at 328 r.p.m. This forms a turbulent oil "pocket" directly above the seal. The problem is further complicated by operating temperatures up to 230° F. Hiller achieves proper sealing at this point by using a National 50,000-S Syntech seal.

National Syntech seals with their precision-molded and accurately-trimmed synthetic rubber sealing members are particularly suited for difficult sealing problems of this type. Seals used by Hiller are of standard design, available in quantity with a minimum of tooling costs. Many sealing problems can be solved quickly and economically with standard design seals; others require special designs for special problems. In either case, National Oil Seal engineers can apply nearly 30 years of sealing experience toward solving the problem.

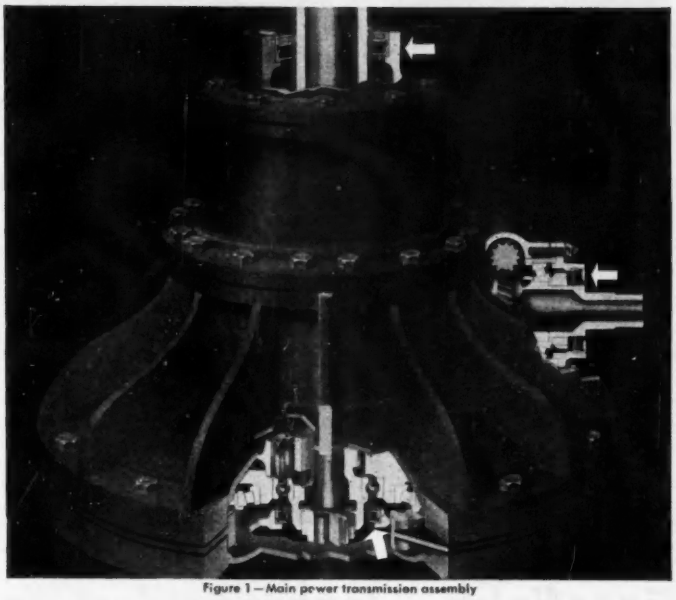


Figure 1—Main power transmission assembly



National 10,000-S Series Syntech*



National 50,000-S Series Syntech*



Hiller Helicopter

* Trade Mark Registered

"Let Your Decision be Based on Precision"

NATIONAL OIL AND FLUID SEALS

NATIONAL MOTOR BEARING CO., INC.

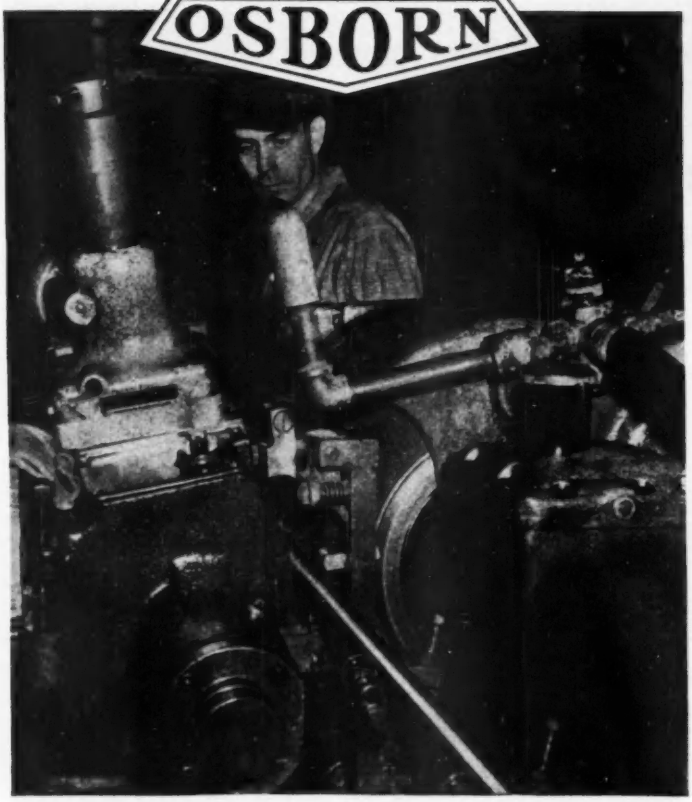
General Offices: Redwood City, California
Plants: Redwood City, Calif.; Downey (Los Angeles County), Calif.; Van Wert, Ohio

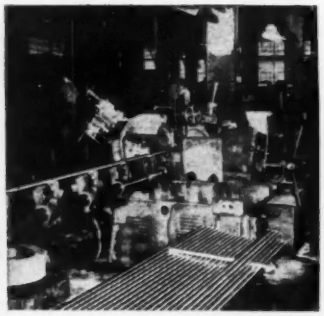
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CALL IN A NATIONAL FIELD ENGINEER

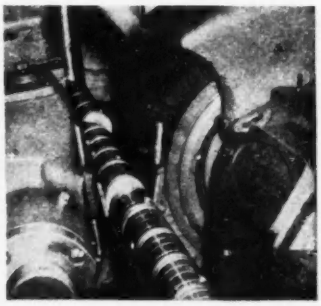
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OSBORN





THE SET-UP. This shows the centerless grinding machine which also serves as a "centerless brusher". These pump rods vary from 1¼ in. to 1½ in. diameter . . . from 6 ft. to 36 ft. in length. Regulating wheel speed is 52 r.p.m.



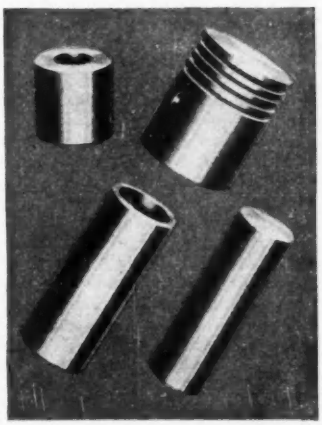
ANOTHER JOB. Here Centerless Brushing finishes cast iron pistons to microsmoothness. Simplifies assembly operations and increases life of pistons and cylinders. Output of this machine is 10,000 pieces per 8 hours.

Finer finish . . . longer product life with Centerless Brushing

This machine does double duty. For removal of metal to close tolerance, it is a *centerless grinder.* Then, for finishing the surface to microsmoothness it is a *centerless brusher.* Its conversion takes only a few minutes.

In the operation shown above, nickel-moly steel rods for pumps, are being finished by an Osborn Fascut Brush. Prior to brushing, the same machine with a grinding wheel in place of the brush made a rough grind, taking off .006 inch, and a finish grind, taking off .002 inch. Results of the Centerless Brushing: Produces a smoother finish. Reduces wear in pump packing. Reduces corrosive action on rods; makes them last longer.

An **O**sborn **B**rushing **A**nalyst helped develop this improvement. Ask your **OBA** to help *you* on all problems of cleaning and finishing! Call him today or write *The Osborn Manufacturing Company, Dept. 873, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



TYPICAL PARTS which are being improved by Centerless Brushing include pistons, piston pins, bushings, tubing . . . any cylindrical parts. It can be applied to many sizes of parts and types of material on a mass production basis.

Osborn Brushes

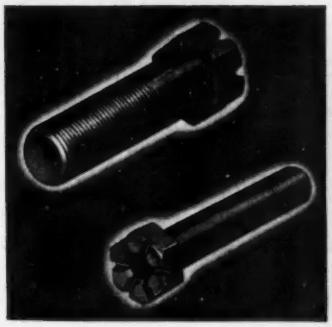
OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

What's *YOUR* fastening problem?

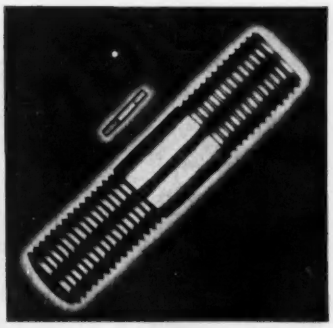


NAT SAYS:

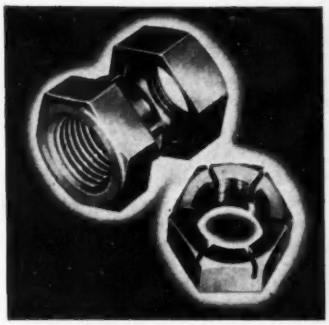
We make many special types of fasteners to solve special problems. Perhaps these will fit *your* particular need.



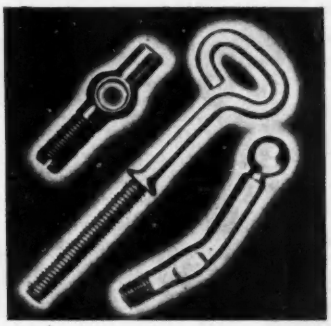
Vibration Problem? . . . The "National" Place Bolt's spring-action head, tightened against a rigid seat, locks the bolt against loosening caused by vibration, insures against impact or shock failure. Now obtainable in carbon as well as alloy steels, providing substantial cost savings.



Positive Locking-Sealing? . . . LOK-THRED bolts, studs and screws actually *become tighter in service*, under vibration. Eliminate need for selective fits and blind tapping —yet provide effective and positive sealing. Available in any size stud, bolt or screw.



Stress, Shear, Shock? . . . "National" Lock Nuts, in a variety of types, are designed to fit every fastening need...for rugged, heavy equipment where severe stress, shock or shear must be overcome . . . for fastening lightweight materials at minimum cost.



Special Fastener Needs? . . . Our engineers can help you find a solution for practically any special fastening problem . . . requiring an unusual type of bolt, nut, screw, pin or headed or threaded part. And we can produce it for you economically.

Write Now

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HEADED AND THREADED
PRODUCTS

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National Screw & Mfg. Co.
2440 East 75th St.
Cleveland 4, Ohio

Please send information and technical literature on:

_____ Place Bolts _____ Lok-Thred

_____ Lock Nuts _____ Special Fasteners

Name _____

Firm _____ Title _____

Address _____

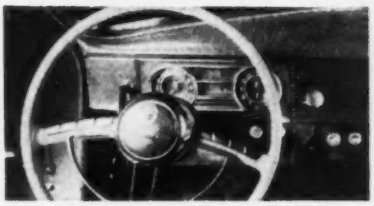
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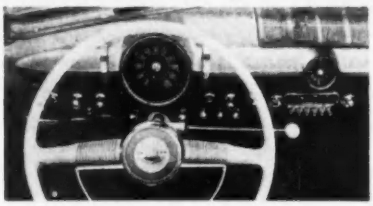
National Products • FASTENERS HODELL CHAINS CHESTER HOISTS

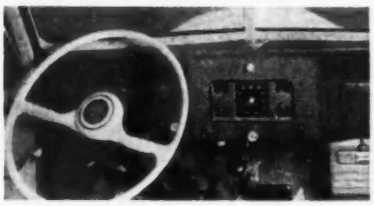
FIVE of the REASONS

for the Superiority of

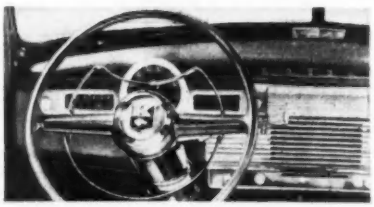
KS **DASHBOARD INSTRUMENTS**











King-Seeley electric dashboard instruments have long been superior in the automotive field because:

1. Their performance is always reliable—gives the car owner no cause for a gripe.

2. All connections are made with standard electric wire, thus they are easily installed by production line methods.

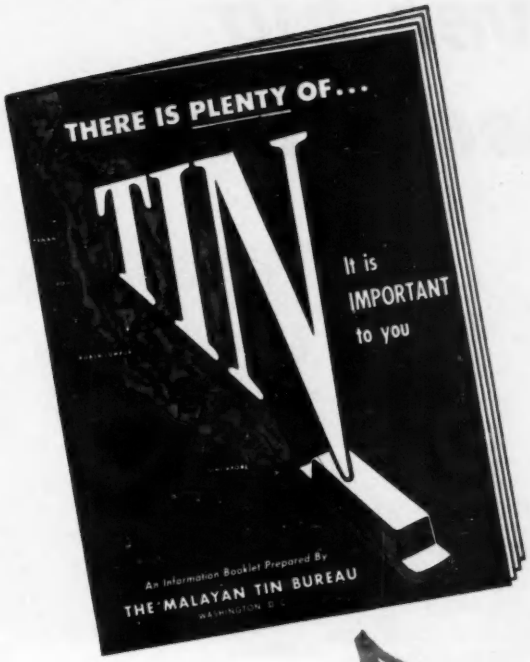
3. No tubing is needed. Wires are used instead. Consequently the danger and annoyance of broken tubes are eliminated. No tubing holes in the dash. Engine noises cannot be telegraphed to the dash as they are by tubing.

4. The vehicle manufacturer can always depend on strict adherence to the delivery schedules of King-Seeley instruments.

5. King-Seeley research engineers are constantly searching for a way to improve the effectiveness, dependability, and economy of these instruments.

In the last seventeen years 50,000,000 K-S instruments have been installed in automobiles and trucks. For more detailed information, write to King-Seeley or ask for a representative to call.

KING-SEELEY CORPORATION
ANN ARBOR, MICHIGAN
PLANTS AT ANN ARBOR, SCIO, AND YPSILANTI



HERE ARE THE REAL FACTS ABOUT TIN

❶ *THERE IS PLENTY OF IT*

❷ *IT IS ECONOMICAL TO USE*

Rumors and myths about a "scarcity" of tin, about "high prices" for tin, have given the American people wrong impressions. This is a potentially dangerous situation.

You should know the truth.

To help you get it, we have prepared a 20-page booklet giving detailed facts and figures that bring the over-all picture into sharp focus. You want—you *need*—the important information this booklet can give you. A moment now to clip this coupon will bring a copy to your desk. May we hear from you?

MALAYAN TIN BUREAU

THE MALAYAN TIN BUREAU

Department 401

1028 Connecticut Avenue, Washington 6, D.C.

There Is Plenty of Tin in Malaya

THE MALAYAN TIN BUREAU
Department 401
1028 Connecticut Ave.
Washington 6, D.C.

Gentlemen:

Please send at once my copy of the 20-page booklet, "There Is Plenty of Tin."

Name .....

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Street .....

City ..... State .....

Moves big payloads faster



—at lower cost

BIG earth-moving vehicles like this twin-engine self-loading scraper get more work done faster because of Allison TORQMATIC DRIVES. These time-proved hydraulic drives — more than 10,000 have been built for Army tanks and heavy-duty vehicles—make multiple engine applications possible —and practical.

TORQMATIC DRIVE provides a smooth, steady, oil-cushioned flow of power—high-starting torque with uninterrupted acceleration —protection against shock-load damage to engines and equipment. It eliminates engine lugging and stalling while maintaining power to drive wheels at all times. This permits the engine to operate in its most effective speed range by balancing engine power with load requirements.

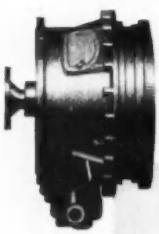
Users of trucks, scrapers and other vehicles equipped with TORQMATIC DRIVE *report up to 30% more work done and 15% less cost per yard than with a mechanical drive* — additional good reasons why engineers are designing Allison TORQMATIC DRIVES into all types of heavy-duty equipment.

Allison TORQMATIC DRIVES are the only heavy-duty full torque-shifting vehicle transmissions available today—engineered for compactness, permitting flexibility of drive-train design for today's and tomorrow's vehicles.

Like to know more about TORQMATIC DRIVES? Write us for Engineering Data Bulletin which gives full specifications.

ALLISON *Division of* GENERAL MOTORS
Box 894A, Indianapolis 6, Indiana

GM GENERAL MOTORS

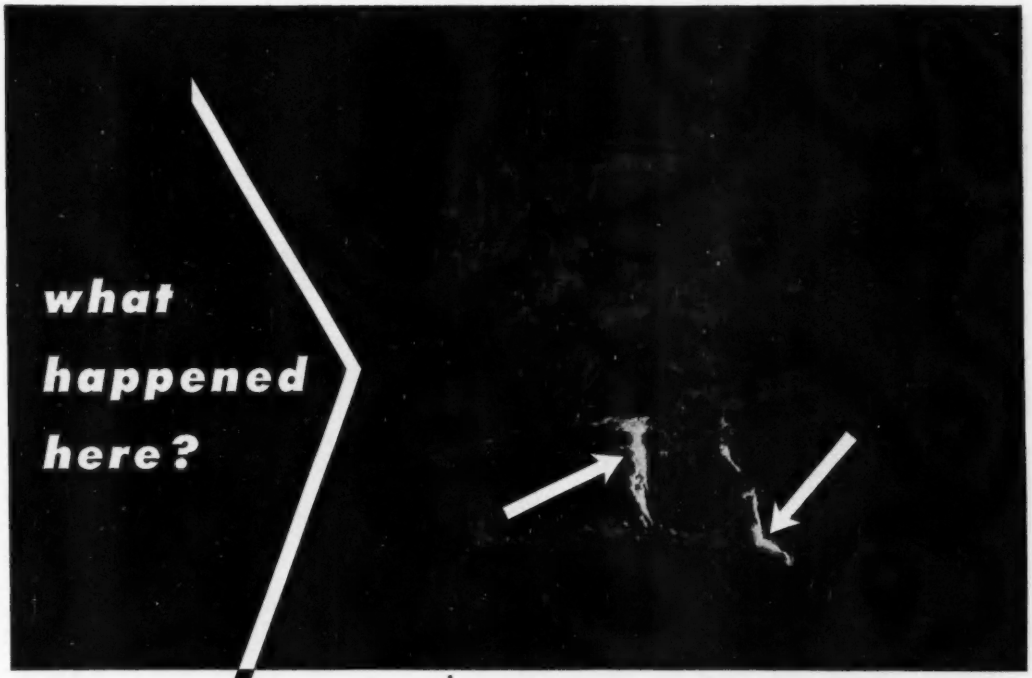


Compact, efficient hydraulic drive for . . .

Allison TORQMATIC DRIVES



CRANES TRACTORS TRUCKS SHOVELS LOCOMOTIVES DRILLING RIGS



. . . and why it saved plenty to find out

These are "invisible" cracks in a casting. They were discovered and made visible in rough state by inspection with Zyglo, one of Magnaflux' many methods used to detect defects.

If these cracks occured in just one piece, it wouldn't be so important. But if they happen in 1,000—or 100,000—that's different. If the defects aren't found until *after* machining, it's costly. Early detection prevents an exorbitant waste of material, time, manpower and profits!

This looking beyond *effect* to find *cause* and *correction,* is what we at Magnaflux mean by process control. No matter what *you* make—or what materials you work with—the chances are that one or another of our methods can help you reduce costs by finding defects and correcting their cause at the most economical stage of production.

Manufacturers of everything from dishes to diesel locomotives are profiting through such use of Magnaflux' Methods. They include some of the foremost and most efficient producers in the world! One of them says, "It's just common sense". . . and another that "It's trading dimes for dollars."

Why not find out right now what process control through Magnaflux' Methods can do for *you?* There's an interesting new Bulletin on the subject that we'll be glad to send you if you'll mail the coupon.

MAGNAFLUX' INSPECTION METHODS

available for—

Detecting defects in magnetic and nonmagnetic metals . . . ceramics . . . glass . . . plastics . . . powdered metals

Stress measurement and analysis

Rapid thickness measurements from one side only

High-speed quantitative and qualitative measurement and evaluation of parts, materials and assortments

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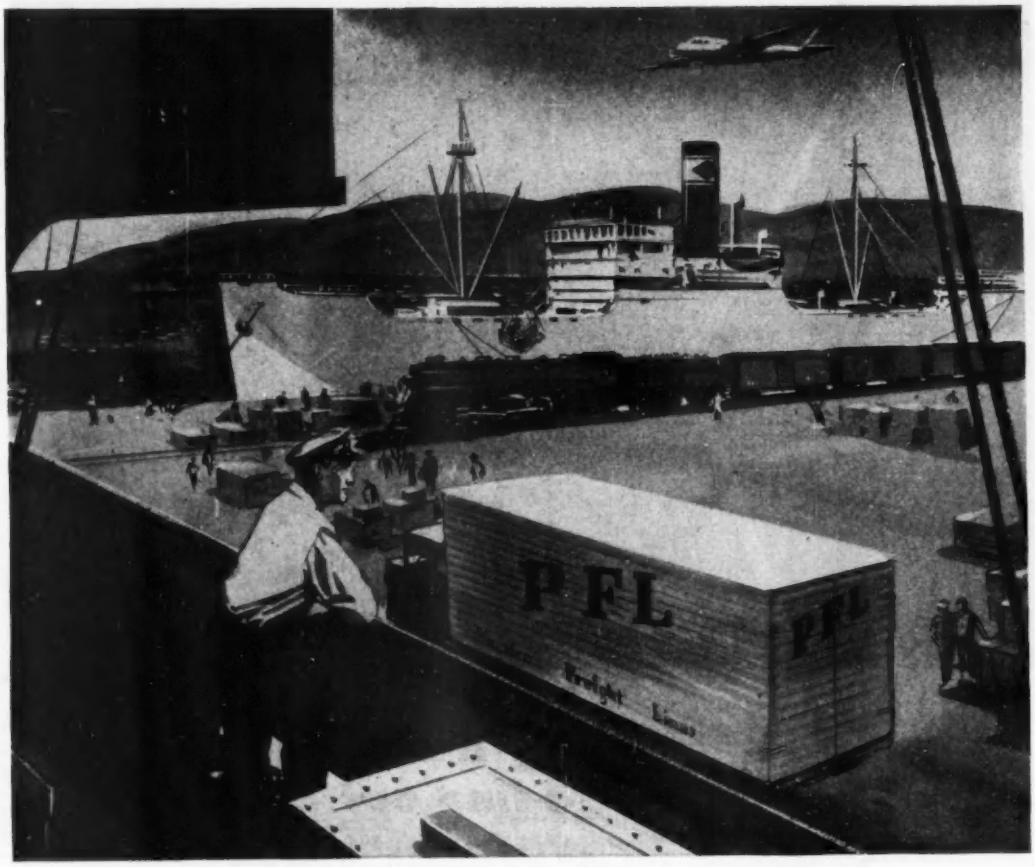
Please send me a copy of your bulletin on profitable process control through Magnaflux' Methods.

Name .....

Company Name .....

Address .....

City ..... *Zone* ..... *State* .....



...and FRONTIER 40-E ALUMINUM ALLOY

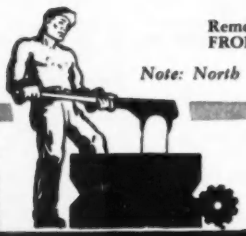
helps keep them all going

STRONG

Look down on any bustling harbor scene, ride the rails into any big railway freight terminal, watch the trailer trucks roar along any express highway . . . chances are that FRONTIER 40-E Aluminum Alloy's high strength and light weight are being used to advantage wherever you look. Radar equipment, aircraft parts, truck axles, ventilating fans, railroad jacks — diversified products but all operating with greater efficiency because they're made with 40-E. Machineability, shock, and corrosion resistance and pressure tightness are good reasons for FRONTIER 40-E Aluminum Alloy's popularity among U. S. industries.



• Find out about the many advantages FRONTIER 40-E offers you. WRITE TODAY for full details and FREE DATA BOOK.



Remember — if ALUMINUM can do it better — FRONTIER 40-E ALUMINUM ALLOY can do it *best!*

Note: North American Smelting & Refining Company is licensed to produce 40-E Ingot.

FRONTIER BRONZE CORPORATION

4885 PACKARD ROAD, NIAGARA FALLS, NEW YORK

Again... proved BEST!

Over-all engine wear REDUCED.... 78%

Ring wear REDUCED..... 33%

in over-the-road tests with

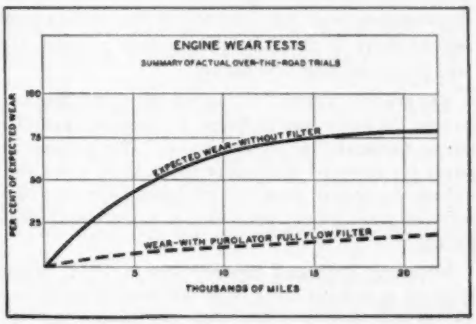
PUROLATOR

FULL-FLOW

MICRONIC FILTERS

In test after test, America's leading automotive and engine manufacturers are proving that Purolator oil filters are the best!

The figures you see above are from engineering records compiled by one of the world's largest makers of passenger cars and trucks. They are the results of gruelling *actual-service* tests made to compare the performance of various makes and types of lube oil filters. And, like so many other important ones, this manufacturer found that Purolator*, *and only Purolator*, oil filters gave them the engine-saving performance they were seeking. They found that Purolator Full-Flow filtration was better by far than *any* partial flow system . . . that the Purolator Micronic* Filter element gave finer filtration, with longer life, at lower pressures than any other tested.



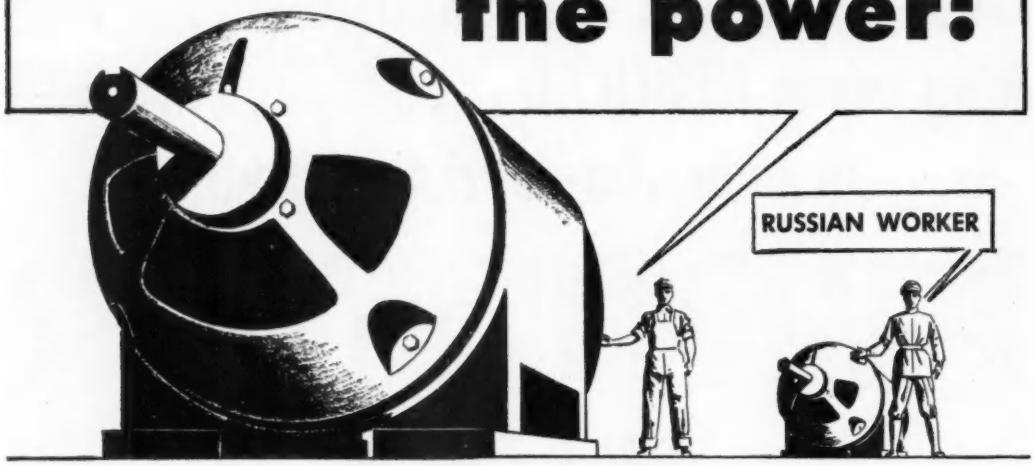
There are sound reasons for the Purolator Micronic Filter Element's outstanding superiority! It is the *only* element capable of delivering full-flow rates during its entire service life, *with dependable filtration down to submicrons* (.0000039 in.)! It has *ten times* the effective filtering area of old-style filters.

If you are a maker or user of internal combustion engines, you are invited to test and *compare* Purolator performance for yourself. Our Engineering Department will gladly co-operate in helping you prove to your own satisfaction *that there is no other oil filter capable of giving you better engine protection than Purolator. Simply write, telling us what equipment you are using.* *Reg. U.S. Pat. Off.

PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory Branch Offices:
Chicago, Detroit, Los Angeles

PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"

AMERICAN WORKERS HAVE 7 times the power!



How does America do it?

Why does the American worker have the help of about 7 times as many kilowatt-hours of electric power as is available to the Russian worker?

How can we Americans produce over 40% of the world's goods and bring so much more of everything to everybody with less than 6% of the world's population? Why is the American output per-man-hour still growing faster and faster?

The answers cannot be laughed off nor are they hard to find. In the words of Ralph J. Cordiner, president of the General Electric Company: "The greatest impetus for forward movement still comes when individuals are free to plan and carry out their own ideas without government coercion or unnecessary regulation."

Including estimated expenditures in 1952, private industry in the last seven years will have invested over 150 billion dollars in new plant and equipment. This contrasts with Federal Government investment of not much more than 12 billion for similar purposes in the same period. Moreover most such Government expenses during the last three years have been allocated to military and atomic projects.

Back of all this progress in private industry is the unique American system of competition—our kind of competition that continually stimulates Americans to make things better and to sell them better—and at lower prices.

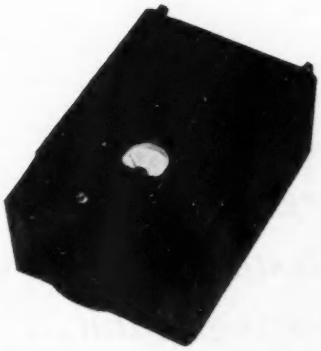
In America we do not just compete for public office; we also compete in technology, competency of management, individual initiative and distribution—the latter including selling and advertising in all their varied forms.

Our kind of competition promotes the growth of more and more businesses and industries—and this means more jobs and expanding prosperity from which we all benefit.

"Planned economies" and other fancy theories are not for us. The American competitive system has given us the highest standard of living in the world. Let's all work to preserve it.

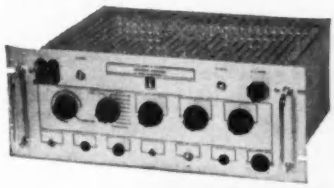
This report on PROGRESS-FOR-PEOPLE is published by this magazine in cooperation with National Business Publications, Inc., as a public service. This material, including illustrations, may be used, with or without credit, in plant city advertisements, employee publications, house organs, speeches, or in any other manner.

THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER OF PEOPLE



AMPLIFIES LOW VOLTAGES

Analysis of static or dynamic conditions involving either high or very low forces is simplified with this Brush Direct-coupled Amplifier. Used with the Brush Magnetic Oscillograph, any need for complicated intermediate equipment is eliminated. The direct-coupled Amplifier has high sensitivity and low drift . . . zero signal drift not more than one chart millimeter per hour.



RACK-MOUNTED STRAIN ANALYZER

This new Brush Strain Amplifier, functionally similar to the standard table top model, is designed for mounting in a standard 19-inch rack. When used with the Brush Direct-Writing Oscillograph, the equipment records either static or dynamic strains with direction and magnitude shown on the chart. Operation is simple, records are immediately available and easily interpreted.



SHOWS SURFACE PROFILE

The Brush Surface Analyzer® shows average roughness in micro-inches, and also provides a chart of surface irregularities. The chart shows a highly magnified profile of the surface, on which variations of less than 1 micro-inch are readily apparent. Eliminates guesswork in specifying and checking finishes.

For complete information write The Brush Development Co., Dept. DD-42, 3405 Perkins Ave., Cleveland 14, Ohio



Charts instantaneously... Saves time!

● You eliminate laborious testing and plotting of data when you use Brush Recording Analyzers. Static or dynamic phenomena, electrical or mechanical in nature, can be recorded instantaneously with high accuracy.

This two-channel Brush Magnetic Oscillograph, used with the proper Brush Amplifier, makes a direct dual-chart recording of voltages, currents, or physical phenomena such as strains, pressures, accelerations, torques, forces, displacements, or vibrations. Either direct inking or electric stylus models are available.

Flexibility is a major advantage with the Brush Oscillograph. Chart speeds of 5, 25, or 125 mm. per second can be selected readily. An auxiliary chart drive for slower speeds is available. Other accessory equipment provides event markings for an accurate time base, or for correlation of events.

Apply time-saving Brush instruments to your testing problems . . . in the laboratory, on the test floor, or in the field. You'll get expert technical assistance from Brush representatives located throughout the U. S. In Canada: A. C. Wickman, Limited, Toronto.

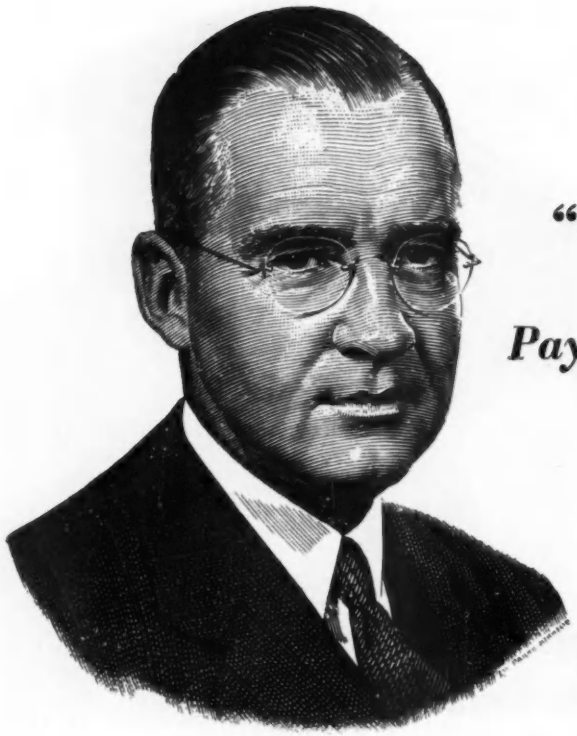
For catalog write The Brush Development Company, Dept. DD-42, 3405 Perkins Ave., Cleveland 14, Ohio

PUT IT IN WRITING WITH A BRUSH RECORDING ANALYZER

THE *Brush* DEVELOPMENT COMPANY

BRUSH

Piezoelectric Crystals and Ceramics
Magnetic Recording Equipment
Acoustic Devices
Ultrasonics
Industrial & Research Instruments



"...I urge employers to install the Payroll Savings Plan..."

M. B. FOLSOM
Treasurer, Eastman Kodak Company

"Continued saving will play an important part in protecting us against a renewal of inflation. The person who saves contributes to the nation's stability and to his family's security. He can now also obtain a higher return on his investment than he could in the past, because of the improvements in Defense Bonds now offered by the U. S. Treasury. I urge employers to install the Payroll Savings Plan wherever practicable, and employees to take advantage of such plan. By investing regularly in improved Defense Bonds, Americans serve their nation's interests as well as their own."

If your company does not have the Payroll Savings Plan—

Please tear out this page and send it to the "Big Boss." Urge that he read, carefully, Mr. Folsom's superb summary of the Payroll Savings Plan and its benefits for employers, employees and our country.

The following figures should be particularly interesting to anyone not familiar with the wide adoption and the steady growth of the Payroll Savings Plan:

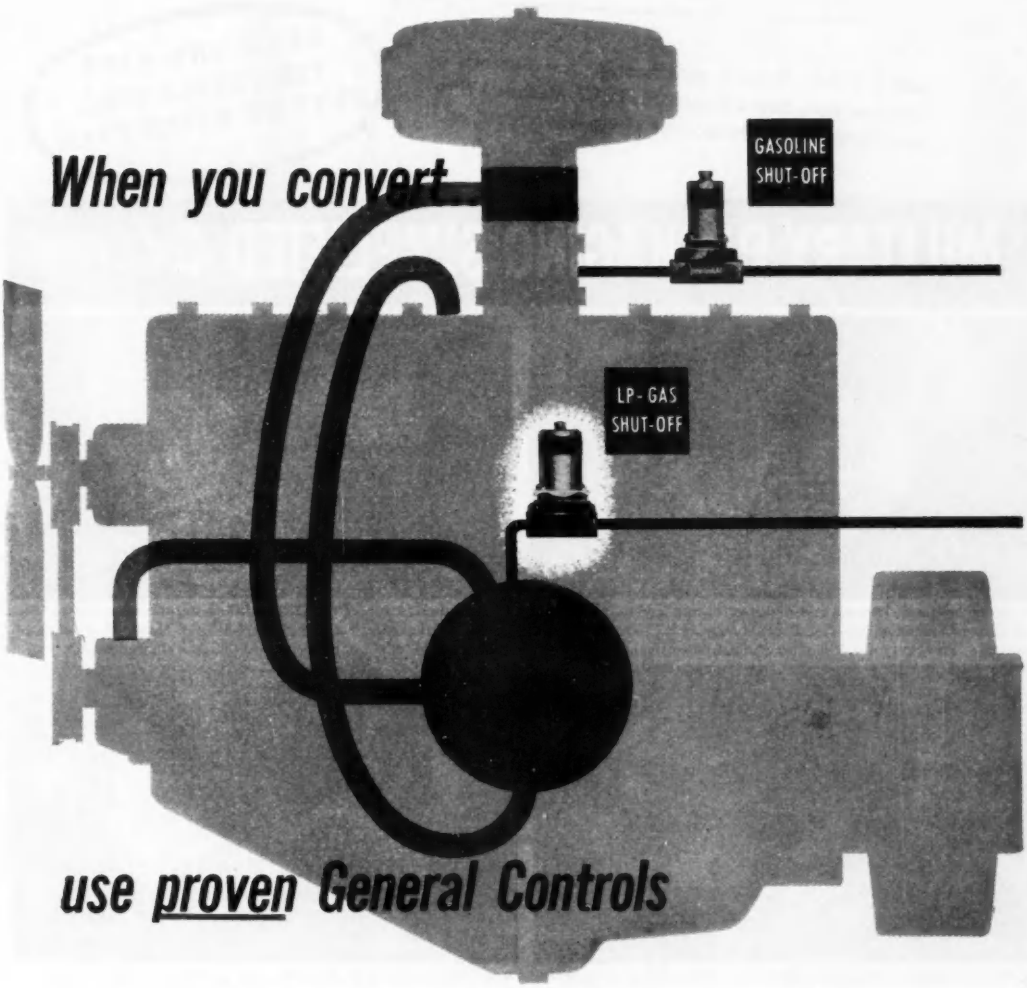
- 45,000 companies offer their employees the Payroll Savings Plan.
- since January 1, 1951, enrollment in The Plan has increased from 5,000,000 to 7,500,000.
- in some companies, more than 90% of the employees are systematic bond buyers—in literally thousands of other companies, employee participation runs 60%, 70%, 80%.
- payroll savers are putting aside $150,000,000 per month in U.S. Defense Bonds.
- the *cash value* of Series E Bonds held by individuals on December 31, 1951, amounted to $34.8 billion—$4.8 billion more than the cash value of Series E Bonds outstanding in August, 1945.

Phone, wire or write to Savings Bond Division, U.S. Treasury Department, Washington Building, Washington, D.C. Your State Director will show you how easy it is to install and maintain the Payroll Savings Plan.

If you have a Payroll Savings Plan, your State Director will show you how to build employee participation through a person-to-person canvass that puts an Application Blank in the hands of every employee. That's all you have to do—your employees will do the rest.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

AUTOMOTIVE INDUSTRIES



Be sure the controls are economical. Be sure they're effective. Be sure they're safe. Be sure you choose pre-tested, pre-proven General Controls Valves.

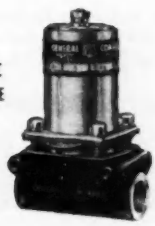
General Controls PV-1C gasoline and propane shut-off valves are normally closed and may be operated in any position, having been designed originally for critical aircraft applications.

Continuous duty solenoids, soft-seated valves and other high performance features assure faultless operation at 10 psi for gasoline and 300 psi for LP-Gas.

Resistant to the shock, vibration and heat of heavy duty mobile equipment, PV-1C Shut-off Valves offer you efficiency and safety factors far in excess of usual field requirements.

Be sure you realize the full advantages of conversion by using these dependable, proven General Controls valves.

GENERAL CONTROLS PV-1C
PROPANE SHUT-OFF VALVE



GENERAL **CONTROLS**
Glendale 1, California — Skokie, Illinois

Manufacturers of Automatic Pressure, Temperature, Level and Flow Controls for Heating, Home Appliances, Refrigeration, Industrial and Aircraft Applications.

FACTORY BRANCHES IN 32 PRINCIPAL CITIES

SEE YOUR CLASSIFIED TELEPHONE DIRECTORY

MIL-P-116A, Military specification for Methods of Preservation, dated March 25, 1952. Method I "Preservative, with Greaseproof Wrap when required."

READ AND SAVE THIS ISSUE FOR FUTURE REFERENCE

MILITARY PACKAGING SIMPLIFIED 6 of a series



1. After thorough cleaning and preservative application, place part on sheet of aluminum foil. Dead soft aluminum foil is ideal for this package, especially if soft-film type preservative is used.



2. Moldable Aluminum Foil (JAN-B-148) is an approved alternate to Grade A greaseproof material (JAN-B-121). Note the absence of "Springback" when applying foil to this odd shaped object.



3. Part completely wrapped. Note how foil conforms to grooves, thereby keeping preservative in close contact with surface.



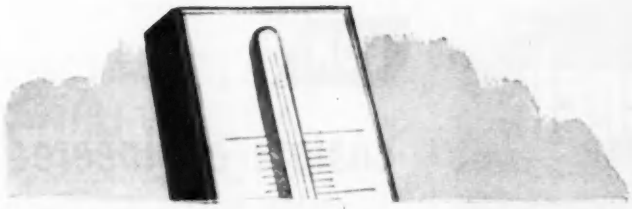
4. Completed package ready for unit packing. Always remember to identify properly each and every package.

SALES SPECIFICATION FOR CIVILIAN PACKAGING!

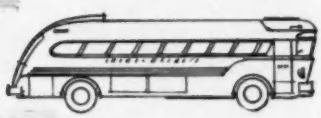
Not by government directive but by *customer preference*, Reynolds Aluminum Foil is the sales specification for civilian packaging. Modern merchandising is changing the whole nature of industrial packaging. What could once be merely utilitarian must now be *sales-compelling* as well. And only aluminum foil gives you the best in utilitarian performance *plus* the most sales-compelling eye appeal. Let us show you what Reynolds Aluminum Foil can do for your civilian packaged products.

For expert help on any packaging problem, military or civilian, call your nearest Reynolds Aluminum Sales Office and ask for "the packaging man." Or write Reynolds Metals Company, 2500 South Third Street, Louisville 1, Ky.

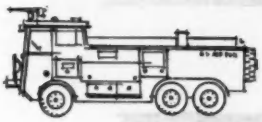
REYNOLDS ALUMINUM



ALL-WEATHER





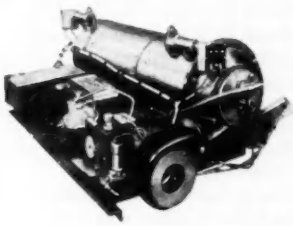


OPERATION ASSURED



with JANITROL LIQUID HEATERS





It's a cold hard fact that *reliable operation in any weather*—right down to 65° below zero—is a tough spec for any vehicle. But it's a requirement that can be met in full with Janitrol liquid heaters—as severe tests have proved repeatedly. On the USAF bomber tow tug built by Euclid Road Machinery Company, for example, positive starting was accomplished without special fuel capsules at –65°F after a 72-hour cold soak, and engine temperature jumped to the 155° to 165°F range well within 60 minutes.

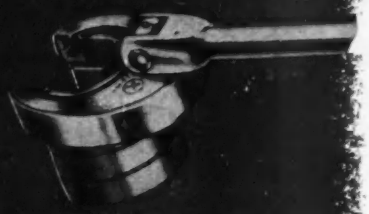
If you're responsible for protecting investments in any vehicles or stationary engines or mobile power plants, gasoline or diesel powered, you'll do well to look into the 6-year long record of Janitrol liquid heater reliability. Your nearest Janitrol representative is always at your service.

HEAT WHEREVER YOU WANT IT **Janitrol**

AIRCRAFT-AUTOMOTIVE DIVISION SURFACE COMBUSTION CORP., TOLEDO 1, OHIO

F. H. Scott, 225 Broadway, New York, N. Y. • C. B. Andersen, 2509 W. Berry St., Ft. Worth, Tex. • L. A. Curtin, 7046 Hollywood Blvd., Hollywood, Calif. • F. H. Scott 4650 East-West Highway, Washington, D. C. • Phil A. Miller; Frank Dock, USAF Coordinator, Central District Office, 400 Dublin Ave., Columbus, Ohio • Headquarters, Toledo, Ohio

this wrench



can slash your costs 3 ways

TAC Open End Ratchet Wrench

delivers incredible savings wherever "tight" situations prevail involving tubing, pipe, conduit, cable or long studs. Saves at least three ways:

1. **CUTS TIME** on production or maintenance operations because it slips around tubing and down fittings, where you ratchet off or on in mere seconds. Functions perfectly with as little as 7° arc clearance for handle. Reduces workman injury too—TAC can't slip off the work and skin up knuckles.
2. **CUTS COST** on fittings, tubing, etc. Snugs down on fittings, never "barks" or scars the hex fitting or strips thread.
3. **REDUCES INVENTORY OF HAND TOOLS** required in your tool crib. Several sockets, a few head sizes, and you eliminate over half the wrenches you'd otherwise maintain.

HERE'S HOW IT WORKS!



"BORROW" ONE— PROVE FOR YOURSELF!

Rated companies may request on Letterhead a sample handle, head and socket, for full trial. We ship on memo billing—returnable for full credit. ACT NOW—"BORROW" THIS MIRACLE WRENCH and prove its value!

Send for free catalog



TUBING APPLIANCE COMPANY
10321 Anza Avenue, Los Angeles, California

FOR

custom engineered... SEATS



Perma Products

MEETS RIGID COST REQUIREMENTS

• THE REAL STORY of seating costs isn't always shown on the initial cost-sheet. It's the *service* cost that counts! Perma Engineering takes into account the relationship of design and intended service . . . how design can be shaped to save materials . . . how construction know-how can OFTEN result in fewer operations, improved service, longer life at lower cost.

What's *your* seating problem? Let Perma Products give you the benefit of proved experience in producing seats for many of industry's most famous names. Write for descriptive folder.

AUTOMOTIVE DIVISION

The PERMA PRODUCTS *Company*
PERMA
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It's called Alcoa Utilitube*. If you use coiled tube, Alcoa Utilitube may very easily cut your tube costs by 40%.

Use it where corrosion is a hazard . . . for fuel and lube lines . . . for hydraulic fluids . . . for air and refrigerants. It will not gum or sludge in petroleum service nor will it discolor or contaminate the fluids it carries.

Forming, flaring and bending are as easy as with annealed copper . . . and Alcoa Utilitube work hardens less. At sub-zero temperatures it actually gets stronger.

Utilitube and fittings are available from your aluminum distributor. Look for his name in your classified telephone directory. Write for a copy of the new booklet, *ALCOA UTILITUBE.*

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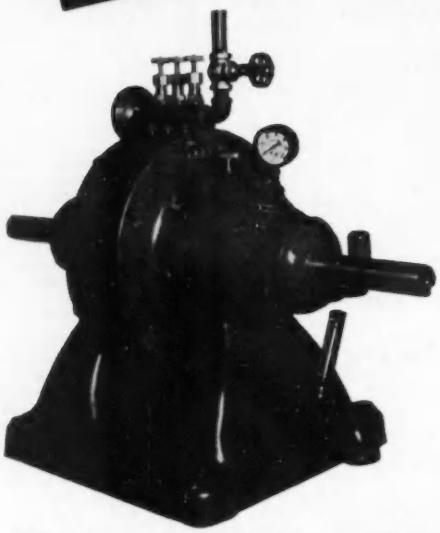
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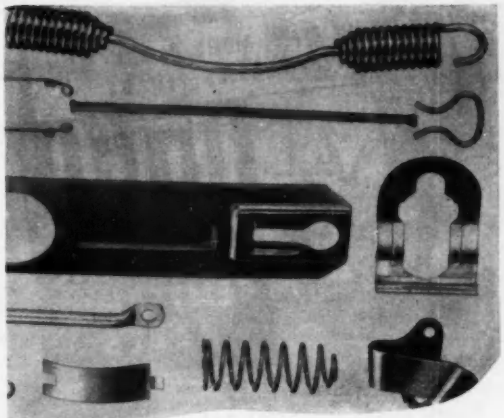
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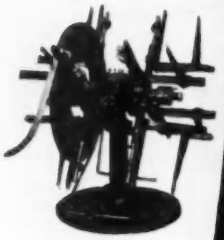


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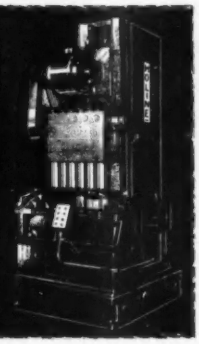
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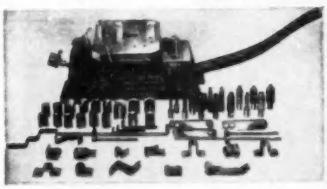
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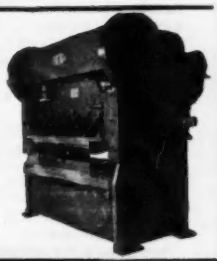
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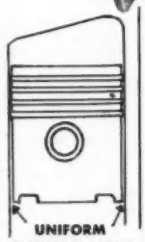
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4. Normal diametral clearance usually less than .001 with uniform skirt bearing.
5. Durability and conductivity comparable to heavy duty design.

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The Original Equipment **PISTONS**

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FOR LOCK WASHERS THAT

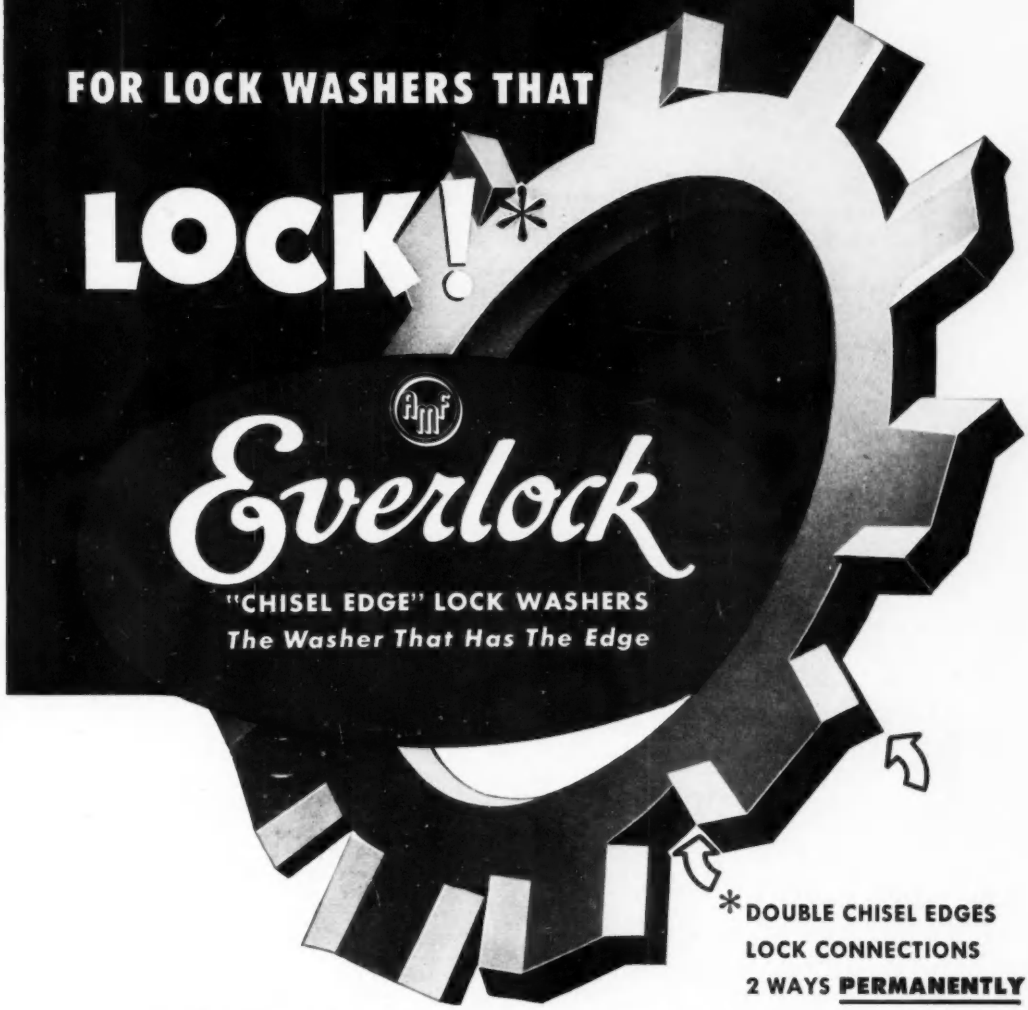
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AMF

Everlock

"CHISEL EDGE" LOCK WASHERS

The Washer That Has The Edge



*DOUBLE CHISEL EDGES
LOCK CONNECTIONS
2 WAYS **PERMANENTLY**

Everlock's alternating chisel edges actually BITE into both surfaces—into the face of the work and the nut—and are held in place permanently by powerful spring tension.

Available in four standard types or special to your exact specifications.

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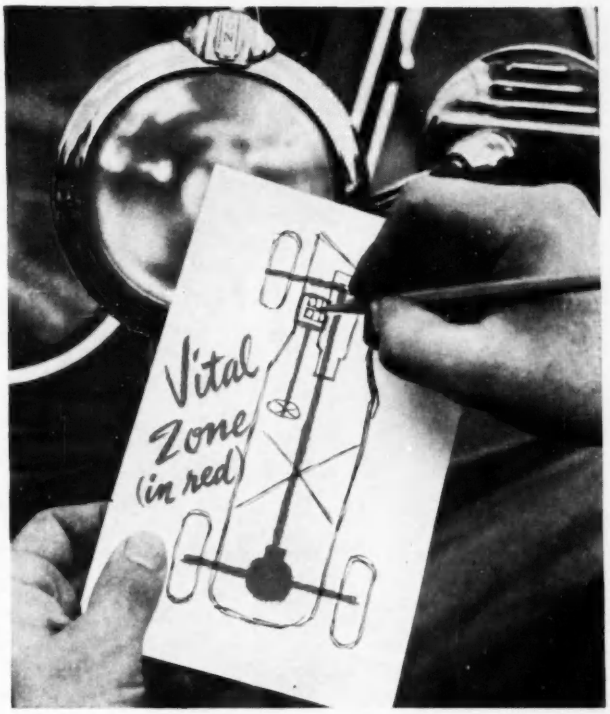
The spotlight is always on value!

WHAT can outshine polish or chrome? Value! That's what keeps a buyer proud of his car year after year. That's what draws extra dollars when it's up for resale.

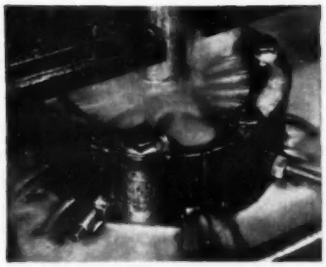
Higher cost of living makes today's car buyers more value-conscious than ever, especially of the moving parts where value counts most—the "vital zone". And here's a way to be sure of value in the "vital zone". Just remember this simple formula when buying component parts for the cars you build.

$$Value = \frac{quality + service + public\ acceptance}{price}$$

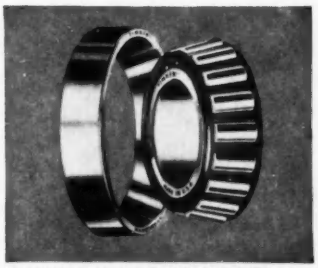
It shows that price is only one factor in value, and must be weighed in relation to the factors *above* the line. Timken® bearings give you far more above the line than any other tapered roller bearing. That's because of their higher quality, better service and greater public acceptance. In terms of value features, Timken bearing prices are lower today than ever. The Timken Roller Bearing Company, Canton 6, Ohio.



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WEAR-RESISTANT, SHOCK-RESISTANT! Cups, cones and rollers of Timken bearings are carburized and oil quenched to give them wear-resistant surfaces and shock-resistant cores. The photo above shows how quenching oil pours in from all sides to assure uniform hardening of the bearing part.



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2. Steel made in our own mill
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4. Rigid quality control
5. More than 50 years' experience

SERVICE

6. Unequalled engineering service
7. Unequalled research and development facilities for your use
8. Installation service in the field
9. Widest range of sizes
10. Most dependable source of supply

PUBLIC ACCEPTANCE

11. First choice throughout industry
12. Best-known name in bearings
13. Widespread advertising

it's TIMKEN for VALUE

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